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Application of the transtheoretical model of behavior change to consumption of fruits, vegetables, and grain products among young adults

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Application of the transtheoretical model of behavior change to consumption of fruits, vegetables, and grain products among young adults

by

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For the Major Program

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For the Graduate College

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ABSTRACT

In this study the transtheoretical model for behavior change was applied to the consumption of fruits, vegetables, and grain products among young adults. The criterion behavior was the consumption of the recommended number of servings described in the United States Department of Agriculture Food Guide Pyramid. Three major constructs—stages of consumption, decisional balance, and self-efficacy—were used. Specific objectives were: develop and validate an instrument to measure the three constructs; use it to measure consumption for fruits, vegetables, and grain products among young adults; examine relationships among the three constructs and among all variables; make recommendations for nutrition education and research. Measuring scales were developed for the decisional balance and self-efficacy portion of the instrument. A stage of consumption algorithm was used to assess the stages of consumption. From 800 surveys mailed to a randomly selected sample of young adults, 18 to 24 years old, 116 usable (14.5%) questionnaires were returned. Factor and reliability analyses were conducted to assess the psychometric properties of the instrument. Decisional balance emerged as two factors—the positive and negative perceptions of increasing consumption. Self-efficacy emerged as one general factor. Confirmatory factor analysis indices indicate the data fit the hypothesized model adequately for the three food groups (AGFI >0.80). The instrument exhibited moderate to excellent internal consistency for perceived advantages (α = 0.47 to 0.63), perceived disadvantages (α> 0.70), and self-efficacy scales (α> 0.88). The results of multivariate analysis of variance indicate that decisional balance and self-efficacy scores differ as stages of consumption change. The perceived advantages and self-efficacy scores increased while scores on perceived disadvantages decreased from precontemplation to maintenance stages with the exception of the action stage for fruits and grain products. At the action stage,

the perceived disadvantages increased, with a corresponding decrease in perceived advantages for grain products. Hispanic origin, gender, race, current relationship status, and living arrangements were significant predictors of either decisional balance and/or self-efficacy among young adults. The results have implications for nutrition education and research.

Key words: transtheoretical model, stages of consumption, decisional balance, self-efficacy, instrument development, young adults

CHAPTER 1. INTRODUCTION

Dissertation Organization

This dissertation consists of an abstract, introduction, review of literature, three individual manuscripts, and conclusions and implications. The introduction includes the conceptualization of the research problem. The literature review discusses eating habits of Americans, conceptualization and measurement of food consumption, the transtheoretical model, the notion of measurement, and attributes of good measuring tools in the social sciences.

The first manuscript is titled "Development and validation of measures of stages of consumption, decisional balance, and self-efficacy for consumption of fruits, vegetables, and grain products among young adults." The second manuscript is titled "Application of the transtheoretical model to the measurement of consumption of fruits, vegetables, and grain products." The third manuscript is titled, "Predictors of decisional balance and self-efficacy for increasing consumption of fruits, vegetables, and grain products among young adults." These manuscripts are suitable for presentation to the *Journal of Health Psychology*, *Journal of Family and Consumer Sciences*, and *American Journal of Health Promotion*. All references are listed in a final reference section.

Need for Study

Great emphasis is placed on increasing the consumption of foods of plant origin in the *Dietary Guidelines for Americans* established by the United States Department of Agriculture (USDA) in 1992. These dietary guidelines were designed to help Americans choose diets to meet nutrient requirements, promote health, support active lives, and reduce the risks of chronic diseases. The place of fruits, vegetables, and grain products as the foundation of a healthy diet also is emphasized in other dietary recommendations such as the Food Guide Pyramid (FGP)

(USDA, 1995). The FGP, an outline of foods to eat each day based on the dietary guidelines, indicates that foods from the grain products group, along with vegetables and fruits, are the basis for a healthy diet. These foods of plant origin are emphasized in the FGP because they provide vitamins, minerals, complex carbohydrates, and other substances important for good health (Harris, 1996).

Even though adequate consumption of these foods is associated with a substantially lowered risk for many chronic diseases such as obesity, high blood pressure, and high blood cholesterol, national surveys illustrate that, for most Americans of all ages, the diet includes too few fruits, vegetables, and grain products (Huang, Song, Schemmel, & Hoerr, 1994; Patterson, Block, Rosenberger, Pee, & Kahle, 1990). As such, there is a gap between the recommended and actual intake of these foods. This suggests that past methods of delivering nutrition education messages have not been effective in promoting positive behavior change. Different ways of defining, measuring, and monitoring nutrition behavior, and of education, appear needed.

The need for new approaches becomes even more critical with the increased recognition that food choices and good diets can help reduce risk factors for chronic diseases. An individual's personal history is identified as the primary source of factors shaping food choice (Furst, Connors, Bisogni, Sobal, & Falk, 1996). Related to this, factors such as emotional attachment, habit, resources, and convenience have been identified as important in understanding and assessing food behaviors of people in general, but especially among young adults (Georgiou, Betts, Hoerr, Keim, Peters, Stewart, & Voichick, 1997; Keim, Stewart, & Voichick, 1997). They are making the transition from parental control of their food intake to being responsible for their own and possibly, that of their children as well (Lau, Quardel, &

Hartman, 1990; Mitchel, Herzler, & Webb, 1994). The food habits formed by young adults at this stage also will become a foundation for future practices that will affect their health throughout life because food behaviors adopted at this stage may become lifelong habits.

Conceptual Framework

Nutrition educators have a significant challenge in finding appropriate conceptual models to use in organizing nutrition curricula and content. Their goal is to teach in ways that incorporate indicators of good dietary habits and guide their adoption to reduce health risk factors. One framework that has been applied to education leading to change toward healthier food choice behavior is the transtheoretical model (TTM) (Rossi, Prochaska, & Diclemente, 1988; McDonnell, Achterberg & Clark, & Bagby 1998; Sandoval, Heller, Wiese, & Childs, 1996; Sporny, & Contento, 1995; Prochaska, DiClemente, & Norcross 1992a). The stage of change is the central organizing construct of the TTM (Prochaska, & DiClemente, 1992; Prochaska, Redding, & Evers, 1997a; Prochaska, & Velicer 1997b).

The TTM proposes that people pass through a series of five stages in the course of changing health-related behaviors and also postulates intermediate or dependent variables. In this study, the stages of change have been defined as stages of consumption because they have been applied to food intake:

- precontemplation: consumption is lower than recommended and the person has with no intent to increase consumption at all.
- contemplation: consumption is lower than recommended and the person has no intent to increase it within six months.
- preparation: consumption is lower than recommended and the person intends to increase it within thirty days.

- action: consumption is equal to or higher than recommended and the person has consumed at this level for less than six months.
- maintenance: consumption is equal to or higher than recommended and the person has been consuming at this level for more than six months.

These stages of consumption can be used to design research techniques to directly observe and readily measure current behavior and intentions about future behavior (DiClemente & Prochaska, 1982; Norman, Velicer, Fava, 1998).

The relative significance of psychosocial constituents of behavior such as attitudes, social influences, self-efficacy, and outcome prospects has been found to differ across the different stages of change for most health behaviors (Brug, Glanz, & Kok, 1997; Glanz, 1994). With regard to food consumption behavior, researchers have explored the potential of incorporating these constituents with the TTM for studying dietary change. Previous studies have only attempted to place people into stages of change (Greene, Rossi, & Reed, 1996; McDonnell, et al., 1998; Sandoval, et al., 1996; Sporny, & Contento, 1995). However, researchers are urged to extend the use of the model to include other important constructs, especially decisional balance and self-efficacy; hence the term transtheoretical. These two constructs explain movement from one stage to another and are empirically associated with the stages of consumption (Prochaska & Velicer, 1997b; Prochaska, 1985; Prochaska & DiClemente 1992; Prochaska, Redding, & Evers, 1997b; Prochaska, 1994; Velicer, DiClemente, Prochaska, & Brandenberg, 1985).

Decisional balance denotes that either positive (pros) or negative (cons) perceptions about a target behavior, as well as the perception of potential success changing current behavior, can be held by a person (Jannis & Mann, 1977; Rakowski, Stoddard, Rimer, Fox, Anderson, Urban, Lane & Costanza, 1997). Results of several studies have suggested that as one progresses

from a less to a more committed stage of change, such as precontemplation to maintenance, decisional balance also changes from more negative (cons) to more positive (pros) perceptions of change (Rakowski, Fulton, & Feldman, 1993, Rakowski, et al., 1997). The person weighs the advantages (pros) and disadvantages (cons) of increasing consumption of grain products, vegetables, and fruits, for example, perhaps deciding to change the balance (Jannis & Mann, 1977).

Self-efficacy is the situation-specific confidence people have that they can cope with high-risk situations without relapsing to an unhealthy habit (Bandura, 1977). For example, young adults have a level of confidence related to improved consumption of fruits, vegetables, and grain products that varies from one individual to another and that may be changed by education and other circumstances. The decisional balance and self efficacy variables are therefore viable constructs when using the TTM to study behavior with the goal of suggesting new interventions for modifying behavior.

Research using the TTM model has focused primarily on unhealthy, addictive behaviors such as smoking, overeating, alcohol abuse, and drug addiction (Prochaska, 1985; Prochaska & DiClemente, 1992; Prochaska & Velicer, 1997a). Few studies have focused on the promotion of healthy behaviors. However, researchers suggest that because the TTM model has been successful with the cessation of unhealthy behaviors it also might work for the promotion of healthy behaviors (Herrick, Stone, & Mettler, 1997; Sigman-Grant, 1996). The acquisition of a healthy behavior also can be viewed as the cessation of an unhealthy behavior.

Research about the needs of various target audiences for nutrition education and appropriate delivery methods ranks as a challenge for nutrition educators. Using the stage of

consumption model and the constructs of decisional balance and self-efficacy in research modes to study new problems, settings, and populations are needed.

Employing the TTM as a conceptual framework provides a means of assessing young adults' readiness and intention to increase consumption of fruits, vegetables, and grain products. Once the assessment has been made, individuals can be better helped to increase consumption of fruits, vegetables, and grain products. The appropriate information and support to be provided at the appropriate stage of change, will be more apparent. Efforts toward behavior change as a goal of nutrition education will then more effectively reduce the gap between level of recommended intake and actual consumption of the three food groups by young adults.

Purpose of the Study

The purpose of this study was to extend the research on the application of TTM constructs to measure consumption behaviors for grain products, vegetables, and fruits among young adults ages 18 to 24 years. The criterion behavior was the consumption of the recommended number of servings of fruits, vegetables, and grain products as described in the FGP. The TTM has appeal because it merges key theories of human behavior to explain why and how behavior change occurs.

This study used the three major constructs in the TTM—stage of consumption, decisional balance, and self-efficacy—to guide the development of an instrument that applies the TTM to the consumption of fruits, vegetables, and grain products. The dependent variables are decisional balance and self-efficacy; the independent variables are the stages of change and demographic variables. Demographic variables were taken as exogenous variables because their causes lie outside the transtheoretical model and are not influenced by variables in the model (Figure 1).

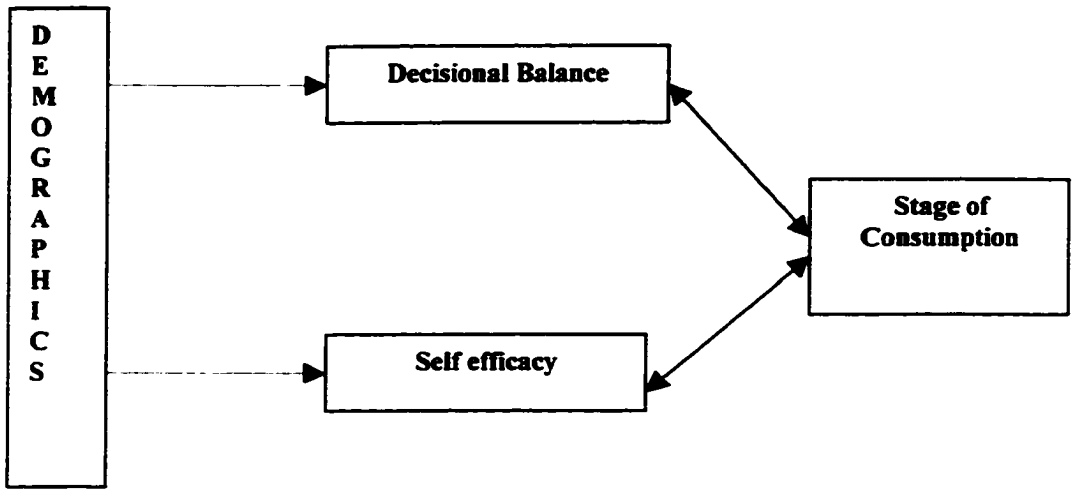

Figure 1. Hypothesized relationships among stages of consumption of grain products, vegetables, and fruits; decisional balance; self-efficacy; and demographic characteristics

Specific objectives of the study were to:

1. develop and validate an instrument to measure stages of consumption, decisional balance, and self-efficacy for consumption of fruits, vegetables, and grain products.

2. use the instrument to gather data about stages of consumption for fruits, vegetables, and grain products, and decisional balance and self-efficacy.

3. examine the relationships among decisional balance, self-efficacy, and stages of consumption for fruits, vegetables, and grain products in relation to the transtheoretical model.

4. determine if demographic characteristics of young adults are associated with differences in decisional balance and self-efficacy as they impact stages of consumption for fruits, vegetables, and grain products.

5. based on findings, make recommendations for changes and new directions for nutrition education and nutrition education research.

CHAPTER 2. LITERATURE REVIEW

Introduction

This chapter reviews literature related to the question of what is adequate consumption of fruits, vegetables, and grain products as defined by the Dietary Guidelines for Americans (United States Department of Agriculture (USDA), 1992, 1995). Trends related to consumption of fruits, vegetable, and grain products in general, and among young adults in particular, are discussed. Further, literature related to stages of change theory and the transtheoretical model of behavior change is reviewed (Prochaska, Redding, & Evers, 1997a). Finally, literature on measurement and characteristics of good measuring tools is presented.

Research findings have demonstrated that low consumption of foods from plant origin is a risk factor for the development of diet-related problems such as cancer, diabetes, obesity, and heart diseases (National Research Council, 1997; Frazao, 1995). Obligated to continually inform the American public about an adequate diet, the United States Department of Agriculture developed dietary guidelines (USDA, 1995). The dietary guidelines are an aid to help Americans choose diets that will meet nutrient requirements, promote health, support active lives, and reduce chronic disease risks (USDA, 1992; Kantor, 1996).

To reinforce the dietary guidelines, food recommendations in the Food Guide Pyramid (FGP) were designed to stress the recommended number of servings per day as a basis for healthy diets (Welsh, 1994). The FGP uses realistic, typical household measures such as cups and slices of food to define serving sizes, with the understanding that such measures are easy to determine and create meaning.

Although the consumption of plant foods is associated with a substantially lower risk for many chronic diseases, current food consumption patterns are not consistent with these

guidelines (Breslow, Subar, Patterson, & Block, 1997). Most Americans of all ages eat fewer than the daily-recommended number of servings of grain products, vegetables, and fruits (Harris, 1996, p. 21).

The ultimate goal of nutrition guidance is sustained behavior change, with the intent of accelerating the shift toward healthful diets. The ability to influence food choices or change behavior is increasingly becoming a great challenge. Many mediating factors that would make healthy food choices possible also influence one's ability to achieve and sustain behavioral change: cognitive, affective, and behavioral skills; current practices; personal factors such as behavioral intent; behavioral expectancies; health values; self-efficacy; and environmental support (Prochaska, DiClemente, Velicer, & Rossi, 1997; Schwartz, 1996). The gap between nutrition knowledge and food choice behavior implies that modes of communicating nutrition information are not effective in promoting changes in food consumption.

Understanding how people decide what to eat and the reasons for these decisions are prerequisites to undertaking any effort to change behavior. No doubt, the dietary guidelines and recommendations are an integral part of nutrition policy and education. However, dietary guidelines must be behaviorally focused to make a difference (American Dietetics Association, 1996). The key to success in nutrition communication is a clear understanding of the desirable outcome or impact on the target audience (Schwartz, 1996). That is, the behaviors addressed through nutrition messages should be drawn from the needs, perceptions, and experiences of the target audience as well as from national health goals (USDA, 1995).

Although success in dietary change rests on individuals adopting and maintaining specific behaviors, few nutrition interventions are grounded in theories of behavior change (Galavotti et al., 1995). The development, refinement, and evaluation of such programs are

severely hampered by the lack of systematic frameworks for positing which factors are transformable as a result of intervention, and for measuring program effect. The American Dietetics Association (1996) emphasized the need to go beyond providing information to incorporating methods for actually creating behavior change. Can nutrition education make a difference? This question raises a further question of "make a difference to what?" and draws in the issue of how this difference can be measured and attributed to the educational interventions.

Adequate consumption

The question of what should one eat to be healthy was addressed in 1980 by nutrition scientists from the USDA and the Department of Health and Human Services (DHHS). The notion of adequate food consumption underlies the concept of achieving adequate nutrition. Consequently, the concept of adequacy implies a diet that assists the public in achieving and maintaining optimal nutritional health. The acknowledgment of the critical role played by diet in health promotion and disease prevention prompted the development of dietary guidelines. The dietary guidelines are supported by a rich history of science-based research. In 1995, the United States released its fourth set of dietary guidelines since 1980. The audience for these guidelines is all Americans. The USDA/DHHS dietary guidelines for Americans are:

1. Eat a variety of foods.
2. Balance the food you eat with physical activity–maintain or improve your weight.
3. Choose a diet with plenty of grain products, vegetables, and fruits.
4. Choose a diet low in fat, saturated fat, and cholesterol.
5. Choose a diet moderate in salt and sodium.
6. If you drink alcoholic beverages, do so in moderation (USDA, 1995).

As in previous guidelines, the above guidelines emphasize variety, balance, and moderation in the total diet. The first two focus on variety and weight maintenance. The remaining four guidelines describe specific characteristics of a good diet.

Researchers have noted the need to go beyond information to provide methods and strategies that promote behavior change (Cullen, Bartholomew, Parcel, & Kok, 1998). Information from the American Dietetic Association (ADA) further explains that what consumers want are food guidelines translated into behaviors, directions, and how-tos (ADA, 1996). This is an indication that dietary guidelines, such as consuming plenty of vegetables, grain products, and fruits, are not directly meaningful to consumers because the information is not framed in terms of consumers' actions (ADA, 1996). With this in mind, the United States Department of Agriculture developed the FGP. In April 1992, USDA officially released revisions in the government's nutrition recommendations (Welsh, 1994). The old "four food groups" concept was replaced with the new FGP.

Based on current research about diet and disease, these new recommendations place greater emphasis on fruits, vegetables, and grain products, and less emphasis on animal products such as meat and dairy. Forming the base of the pyramid is the bread, cereal, rice, and pasta group. The second largest layer is for fruits and vegetables. USDA recommends the most (6 to 11) servings from grain products, 3-5 servings from vegetables, and 2-4 servings from the fruits group each day because foods in these groups are an excellent source of complex carbohydrates (important for energy, especially in low-fats and sugars).

The FGP is a graphic illustration to help people choose what and how many servings to eat from each food group (Figure 2). Those who adhere to the general guidelines set forth by the FGP should get the nutrients they need without too many calories or too much fat, saturated

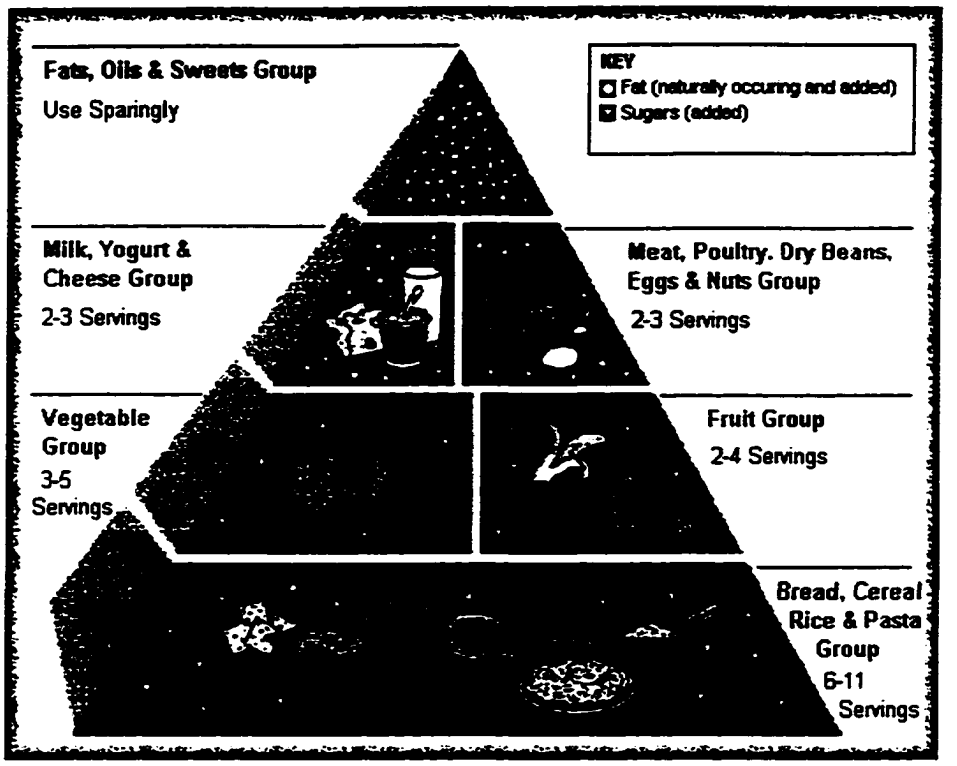

Figure 2. Food Guide Pyramid (USDA, 1995).

fat, cholesterol, sugar, sodium, vitamins, minerals, and fiber alcohol (ADA, 1996). At the same time, these foods are naturally low in fat, sugar, and sodium. The serving sizes are given only as a general guideline.

In this study, the FGP was used as a behavioral marker for the criterion of adequate food consumption for the following reasons:

1. The FGP clearly illustrates that foods from the grain products group, along with vegetables and fruits, are the basis of healthy diets. Figure 2 depicts these foods as separate and distinct foods; shape illustrates the relative proportions of each food group in a healthy diet. These three food groups along with others provide vitamins, minerals, complex carbohydrates, and other substances that are important for good health.

2. The FGP emphasizes variety in the diet with grain products, vegetables, and fruits as key components. The emphasis is not only on the different kinds of food, but also on the variety within each food group. One can achieve a healthful, nutritious eating pattern by choosing a variety of foods within and across food groups.

3. The FGP is an easy way to make healthy food choices. The recommended number of servings range from a low to a high value. This allows for flexibility in the level of consumption for age, size, and level of activity. Furthermore, the recommended numbers of servings are in typical and familiar household size measures such as cups, slices of bread, or whole fruit—measures that are meaningful and realistic to consumers.

For most people, it is unnecessary to actually measure each serving of food. The familiar units facilitate an easy way to self-assess the adequacy of one's diet. The use of the pyramid as a dietary behavioral marker eventually should lead individuals closer to meeting the dietary guidelines. It would ensure that not only are a variety of foods consumed, but also that a diet with plenty of vegetables, fruits, and grain products is consumed.

Eating Habits of Americans

According to the U.S. Surgeon General, the three most important personal habits that influence health are smoking, alcohol consumption, and diet. For two out of three adults who do not drink excessively or smoke, the single most important personal choice influencing one's long-term health is what one eats. The Surgeon General's Report on Nutrition and Health (USDHHS, 1988) establishes the fact that two-thirds of all deaths—including coronary heart disease, stroke, atherosclerosis, diabetes and some types of cancer—are related to what people eat.

A review of the second National Health and Nutrition Examination Survey (NHANES) data reveals that the number of adults meeting the guidelines on a given day is very low (McDowell, Green, Caughman, Briefel, Loria, & Johnson, 1992). Less than one-third of the respondents met either the vegetable guidelines (22%) or the fruit guidelines (29%). Only 9% met both. Eleven percent had eaten neither a fruit nor a vegetable; almost half (45%) had eaten no fruit, and 27% had eaten no vegetables. These same data showed that on any given day, the average number of fruit servings for adults was slightly more than one, and the average number of vegetable servings was slightly less than two.

Highlights from the baseline survey (McDowell et al, 1992) confirm that awareness of the proper number of daily fruit and vegetable servings is very low. Only 8% of American adults think they should eat 3-5 or more servings of fruits and vegetables each day, and 66% think 2 or fewer servings is sufficient. Consumption also lags below recommended amounts. Only 23% of them were eating 5 or more servings of fruits and vegetables a day.

Trends related to grain products, fruits, and vegetables consumption

According to Harris (1996), a Gallup survey of 1,000 primary food shoppers shows progress in efforts to educate Americans about grain consumption. The survey found that three servings of bread and other grain products a day was the average consumption. Though lower than the recommended 6 to 11 servings a day, this consumption indicated a slight improvement (equivalent to an additional slice of bread per week) over the 2.8 daily servings averaged in a 1993 Gallup survey. This change in grain consumption is attributed to familiarity with the FGP (with grain servings at its base), which doubled from 27% in 1993 to 56% in 1995. The report (Harris, 1996) also confirmed a decrease in the number of Americans who believe the myth

"bread is fattening." This number decreased from 49% in 1993 to 40% in 1995. However, most people still need to meet at least the lower end of the 6-11 recommended daily servings.

Fruit and vegetable intake, on the other hand, fell short of the FGP recommendations. Though the average intake from the vegetable group is about three servings per day, half of the total vegetables consumed are from the following five foods: canned tomatoes, fresh and frozen potatoes, head lettuce, and onions. Some of these choices are lower in nutritive value than other vegetables. Consumption of leafy dark-green and deep yellow vegetables, which has been strongly associated with reduced risk of chronic disease, is extremely low. Additionally, consumption was only one and a half servings from the fruit group (USDA, 1995). Recently, researchers found that there is a reason to believe that fruit and vegetable intake fluctuates during adulthood and adolescence (Harnack, Block, Subar, Lane, 1997). Possibly, consumption of these foods is not stable over time.

Young Adults

Results from national and regional surveys show that the typical 18-24-year-old has a diet nearly lacking in vegetables. It is also likely to be low in fruit and grain products (McDowell, et al., 1992; Patterson, et al., 1990; Patterson, Harlan, Block, & Kahle, 1995). Researchers reported that for males, Hispanics, less-educated individuals, individuals with lower incomes, and young adults the reported consumption was even less than the average low (Harnack, et al, 1998). However, those who think they should eat more fruits and vegetables were doing so.

Young adults as a group are not homogenous. Evidently, dietary behavior of college students does not accurately describe the nutritional practices of young adults as a group. College students and college graduates followed practices clearly different from those of non-students with respect to diet (Georgiou, et al., 1997). The same study also identified women as

prone to risks associated with inadequate intake of vegetable and dairy foods. Obvious differences also exist between rural and urban residents (Amos & Brun, 1996).

Need for new approaches

At a time when public interest in nutrition is high, trends show a widening gap between what consumers know and believe about diet and health and what they do to put their awareness into practice (Schwartz, 1996). The need to close the gap between the recommended number of servings and the typical American diet has been noted (Food and Agriculture Organization, 1996; Hertzler & Anderson, 1974; American Dietetics Association (ADA), 1996).

The gap between nutrition awareness and practices of consumers is attributed to numerous and various factors. The view that adequate research has not been conducted to address crucial aspects of nutrition behavior is widespread. Other factors include: nutrition misinformation that confuses consumers and interferes with behavior change efforts; the food industry offering too many choices; too much advertising, with a focus on under–consumption of key foods without addressing related over consumption of others; wavering scientific evidence; the contention as to whether theory is central to both research and practice; and a focus on individual foods and not total diet (ADA, 1996; Amos & Brun, 1996; Gillespie & Brun, 1992; Schwartz, 1996).

Barriers to achieving a healthy diet include conflicting advice on healthy ways to eat (Harnack et al., 1997). In other words, those reporting difficulty consuming a healthful diet have found confusion over dietary recommendations. There is also the belief that healthy foods cost more. Harnack et al., (1998) reported that men are more likely to respond negatively with respect to taste, ease of eating a healthy diet, and conflicting dietary advice. Women are more likely to report lack of support from family and friends. Blacks and Hispanics are more likely to

have negative attitudes about food taste, cost, and dietary advice than whites. Hispanics were less likely to report lack of social support compared to whites. Compared to those aged 18-24 years, members in other age categories were less likely to have negative attitudes toward taste and ease of eating a healthful diet. Cost and conflicting dietary advice especially were major factors distinguishing this age group. Other reports show taste may no longer be a barrier to eating a healthful diet. Krebs-Smith, Heimendinger, Patterson, Subar, Kessler, & Pivonka (1995) reported that most people like fruits and vegetables. Indeed, the reluctance to give up foods currently enjoyed is a primary explanation for not changing a diet.

To bridge the gap between what should be, and what actually is, various options have been suggested. Researchers feel strongly that theoretical models are important for the advancement of both practice and research (ADA, 1996; Gillespie & Brun, 1992; Glanz, Hewitt, & Rudd, 1992; Sporny & Contento, 1995). Johnson & Johnson (1986) demonstrated the effectiveness of nutrition education in promoting informed consumers who value good nutrition and consume nutritious food. They recommended that future nutrition efforts focus on theory building. The beginning should be the development of generic theories regarding the design and implementation of nutrition education programs.

Past attempts at adopting theories to explain dietary behaviors include the use of the health belief model, the theory of reasoned action, the social cognitive theory, and stages of change theory (Achterberg & Clark, 1992; Contento, Balch, & Olson, 1995). Another strategy shown to enhance awareness and establish motivation that precedes behavior change is the use of a personalized self-assessment tool to evaluate dietary status and related behaviors (Contento et al., 1995).

Because dietary behavior change is complex, there is need to understand how people change before effective interventions can occur. This is particularly true with dietary behaviors, because individuals must change awareness, motivation, attitudes, types, kinds, and the amounts of food eaten, change food preparation methods, and change time and economic commitments. Technological development presents a major challenge. Society and industry must accommodate the changes by individuals. Unlike other health behaviors such as smoking or drug consumption, when making dietary changes one must continue to eat to survive. Strategies that promote changes in behavior involve a combination of theories that systematically increase awareness and teach behavioral skills, and then monitor progress while providing incentives and reinforcements for achieving goals (Coates, Jeffrey, & Slinkard, 1981; Luepker, Murray, Grimm, Bloom, & Davis, 1986).

Conceptualization of Food Consumption Behavior

In general, studies on food consumption and related behaviors have been largely descriptive. The focus has been on demographic predictors of vulnerable and at risk groups (Hertzler, Fray, & Ward, 1996). These studies have been useful for quickly identifying factors that contribute to differences in food intake, such as ethnicity, income, geographical location, and college status. However, this approach has led to a focus on groups and sub-populations as opposed to the behaviors. The descriptive empirical work gives rise to indicator variables that do not cause or establish certain food consumption behaviors.

Because of the strong association of indicator variables with other variables such as poverty, lower education, and employment status, and ease in measurement, these indicator variables emerge as significant predictors for food consumption and food choices. Educators could increase the likelihood of success if attention is paid to health beliefs underlying an

intended food choice. This explains the inclusion of not only the stage of change, but also decisional balance and self-efficacy, as key variables in this study.

Over time, three major factors have emerged as important food choice reasons: health, sensory appeal (taste, texture), and expediency (issues such as difficult-to-obtain food, storage, and preparing of foods) (O'Sullivan, Linke, & Dalton, 1985). These factors were salient in responses to the preliminary qualitative interviews conducted in this study. Among the sensory attributes, taste has been found to be the most influential factor in food selection. With regard to the health factor in food selection, the ideal of healthfulness as a learned concept and norm is not always internalized and translated into practice (Achterberg & Clark, 1992). Therefore, the gap between knowledge, intention, and practice persists. The preliminary qualitative research data collected in this study clearly illustrated that, in some cases, sensory appeal of foods such as vegetables, whole grain products, and some fruits could make it difficult for their health value to compete. Expediency factors such as availability and preparation skills also were salient.

More recently, the stages of change theory has been used in implementing aspects of the "five a day" intervention project (Thompson, Shannon, Beresford, Jacobson, & Ewings, 1995); measuring stages of change in fruit and vegetable consumption among grade school children (Domel, Baranowski, Davis, Thompson, Leonard, & Baranowski, 1996), and assessing stages in fat intake (Greene, Rossi, & Reed, 1993; Greene, Rossi, Reed, Willey, & Prochaska, 1994; Lamb, & Joshi, 1996; Sporny & Contento, 1995). A few studies investigated factors affecting food habits of young adults (Georgiou et al., 1997).

Measurement of demographics variables versus constructs

Prochaska, et al. (1994a) explain that marker variables such as those described above have limited utility. This is because they do not identify causal processes that increase or reinforce food habits in certain groups or individuals and due to the fact that demographic variables are not amenable to intervention (Prochaska et al., 1994b). The marker variables also do not develop a means of prevention or intervention. Only theories of behavior change that identify underlying causal variables would explain how variables are related to food consumption and related behaviors. Such models would explain why people do not modify their food consumption patterns despite adequate exposure to a variety of affordable foodstuffs and adequate information. One such theory is the transtheoretical model (TTM) explained below.

The knowledge base about young adults is insufficient in several aspects. First, much of the research is atheoretical and has provided a mere description of factors and attitudes related to food consumption. Second, much of the research has focused on demographics, which are not amenable to interventions. Dietary behavior is a product of social, biological, and cultural factors (Sanjur, 1982). This study recognized diversity among young adults and acknowledged the need for multiple reinforcing strategies to behavior change (Anderson, 1994). Because dietary behavior change is complex, there is need to understand how people change before effective interventions can take effect (Kristal, Patterson, Glanz, & Heimendinger, 1995). The next section reviewed literature related to the stages of change theory, which is the central organizing construct in the TTM.

The Stages of Change Theory

In retrospective, cross-sectional, and longitudinal studies of how people change health behaviors, evidence shows that people move through a series of stages (DiClemente & Prochaska, 1982; Prochaska & DiClemente, 1992; Prochaska, et al. 1994a). The stages of change are a developmental sequence of motivational readiness or intention to modify behavior (Prochaska et al., 1994). The stages described and used in the TTM of this study are similar to stage concepts described elsewhere (Catania, Kegeles, & Coates, 1992).

This theory supports a non-traditional measure of success in behavior change. The stage of change construct is important because it represents a temporal dimension (Prochaska, Redding, & Evers, 1997a). The model conceives behavioral change as a process involving progress through a series of five stages:

Precontemplation. Individuals either are unaware that a problem exists or they ignore the problem. The individual has no intention to act in the foreseeable future, usually measured as the next six months. Traditional intervention programs are not ready for such individuals.

Contemplation. This is the time when one is aware of a problem behavior and intends to change within six months. The people in this stage are now aware of the advantages of changing (pros), but are also acutely aware of the disadvantages (cons). These people are not yet ready for traditional action-oriented programs.

Preparation. This stage also is known as the determination, or the deciding, stage. In this stage, people intend to take action in the immediate future, usually measured as thirty days. These are people who should be recruited for action-oriented programs.

Action. People have made specific and overt modifications in their behaviors within the past six months. Because action is observable, behavioral change often has been equated

with action. Not all modifications of behavior count as action in the TTM, action is only one of six stages.

Maintenance. This stage is defined as the period beginning after six months of active behavior. In this period people work to avoid relapse. They are less tempted to relapse and more confident they can continue their changes.

Termination. This stage applies to risky behaviors and does not apply to this study. This is a stage when people have no temptations and have 100 percent self-efficacy. No matter the circumstance, they would not return to their old habits. With the adoption of healthy behaviors, the goal is lifetime maintenance. As such, the termination stage should be replaced by habituation.

Habituation. The new behavior becomes a habit and is pre-attentive. Figure 3 illustrates the concept of stages of change.

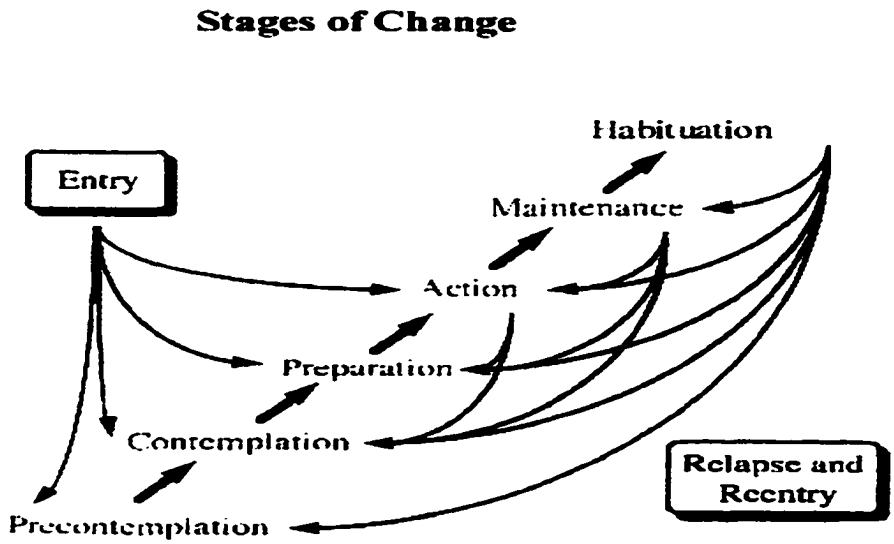

Figure 3. Stages of Change Theory, adapted from Sandoval et al., (1996) and Sigman-Grant (1996)

These stages of change variable have been operationally defined in both categorical and continuous ways. Progression through the stages is not linear. For the majority of health behaviors, people relapse, and return to contemplation or preparation before proceeding on to maintenance (Sandoval et al., 1996; Prochaska, 1985). Relapse is taken as a natural part of the cycle. Figure 3 illustrates that people re-enter the cycle at various points. In addition, the notion of habituation and that some people could be in the precontemplation or contemplation stages, and therefore not prepared to take action is presented. The time and intention dimensions of change, addressed by proponents of the model is a crucial element missing in other theories (Prochaska, 1985; Prochaska et al., 1994).

The utility of the stages of change model as a framework for nutrition education has been discussed extensively (Sandoval et al., 1996; Sigman-Grant, 1996). Sigman-Grant (1996) implies that the reason Americans have not adopted the Dietary Guidelines is because behavioral change has not been set as a goal. Implicit in the development of dietary recommendations is the need for change (Sigman-Grant, 1996, p. 162). In many interventions, the passing of information and teaching of skills have been the basis of intervention.

Determination of stages of consumption

The limitation experienced with determining of stages of change for dietary behavior is a lack of similar understanding of the behavior described by both the respondents and researchers. Past staging questions associated with dietary behavior lacked clarity and specificity Sigman-Grant (1996) suggested including specific definitions and pilot testing of instruments to improve the consumption stage placement.

As discussed above, behavior change is complex and not a single event (Prochaska & DiClemente, 1992). No single explanation captures the scope of change needed to meet even

one of the dietary guidelines. Suggestions for a set of theories aimed at either specific populations or at circumstances have been made (Achterberg & Clark & Clark, 1992; Prochaska & DiClemente, 1992; Sigman-Grant, 1996).

Identification of an individual's stage of food consumption is only one step toward understanding his or her level of consumption. Sufficient attention should be paid to characteristics of each stage. Time is another dimension that must be factored in when trying to change most health behaviors. Barriers to adequate consumption must be identified, as well as the individual's perception of their ability to consume an adequate number of servings. That is, a combination of theories and models would allow nutrition educators to take into consideration the complexity of dietary change, the interaction among variables involved, and the stages of the change process (Ni-Mhurchu, Margetts & Speller, 1997).

Transtheoretical Model of Behavior Change

The TTM describes the relationship among several concepts with the stage of change as the central organizing construct in the model (Prochaska, Redding, & Evers 1997b). Previous studies have found an integral relationship between stages of change dimension and outcome, or intervening variables such as decisional balance, self-efficacy, and temptation (DiClemente, 1991, 1993; Fava, Velicer, & Prochaska, 1994; Prochaska, 1985; Prochaska, Redding, & Evers, 1997b). The TTM postulates that both the cessation of high-risk behaviors and the acquisition of healthier alternatives involve progression through stages of change. This model meets many competing demands and reflects the broad range of ways that people change, both on their own (self-change) and with the aid of interventions.

The focus on an individual in the TTM was the key in this study because people control their own nutrition and food-related behaviors. Food choices are highly individualistic (Furst,

et al., 1996). However, it must be recognized that diversity exists within this seemingly homogenous group. Age, culture, and socio-economic backgrounds foster differences among individuals. For these reasons, this study focused on a target audience— the young adults and their specific needs, behaviors, experiences, and perceptions.

In the investigation of the TTM, several dependent and intervening variables are associated with the stages of change (Prochaska, 1985). The cognitive constructs that have received the most attention are decision balance and self-efficacy. These constructs, however, have not been applied to food behaviors.

Decisional Balance. Normally, the definition of stages integrates behavior-to-date with intention to continue (Rakowski, Fulton, & Feldman, 1993). The intention to increase consumption of a food is subjective judgment and may be related to the evaluation of pros and cons based on a variety of perceptions about nutrition and food consumption.

The construct of decisional balance reflects an individual's relative weighing of the benefits and disadvantages of increasing consumption of fruits, vegetables, and grain products. Decisional balance is a summary index derived from two variables: the pros and the cons (Prochaska, 1985). The decisional balance varies for an individual position in the stage of change. In the higher stages of action and maintenance, the pros for adopting change are higher than the cons.

Incorporating the decisional balance construct tests the ability of the TTM to integrate core constructs from an alternative conflict model (Jannis & Mann, 1977). The assumption behind this model is that sound decision-making involves careful scanning of all relevant considerations of potential gains and losses. The usefulness of allying the decisional balance

construct with stages of change to study how levels of motivation change across the stages in interpretation of health-related issues has been noted (Herrick, Stone, & Mettler, 1997).

Velicer, DiClemente, & Prochaska (1985) concluded that the decisional balance could be used, along with stages of change, to study the pattern of cognitive and motivational shifts across the stages in resolution of other health-related problems as well. Rather than the eight factors that needed to be balanced in the original model by Jannis & Mann (1977), there are only two factors— pros and cons— for the behavior in question.

Prochaska (1985) demonstrated the predictive utility of the decisional balance measure. Over time, the pros and cons/decisional balance measure has become a critical construct in the TTM. Several studies illustrate that the balance between the pros and cons varies depending upon the stage of change (Prochaska et al., 1994; Reed, Velicer, Prochaska, Rossi & Marcus 1997). For the precontemplation stage, the cons outweigh the pros; at the action stage, pros outweigh the cons. Depending on the behavior in question, the crossover point has been reported to occur in contemplation, preparation, action, or maintenance (Fava, Felicer, & Prochaska, 1994). The cross over indicates a decrease in the cons of the behavior and a simultaneous increase in the pros.

Self-efficacy. Self-efficacy refers to the situation-specific confidence people have that young adults can consume the recommended amounts of fruits, vegetables, and grain products irrespective of their situations without relapsing (Bandura, 1977, 1991, 1992). Bandura (1977, 1982, 1991) introduced the concept of self-efficacy in behavior modification. Since then, it has become a key variable in clinical, educational, social, developmental, health, and personality psychology (Schwarzer & Fuchs, 1997). The major assumption stresses that all behavior change is facilitated by a personal sense of control. Self-efficacy pertains to personal action

control or agency (Maddux, 1991; Bandura, 1992). The "can do" assertion mirrors a sense of control over one's environment. It reflects the belief in being able to master challenging demands by means of adaptive actions (Schwarzer & Fuchs, 1997, p. 163).

Because self-efficacy is based on experience, it does not lead to unreasonable risk-taking, but to venturesome behavior that is within reach of one's capabilities. The outcome or behavior exhibited in any situation appears to involve two sub-constructs of self-efficacy. These sub-constructs are action-outcome expectancies and personal resource beliefs, and they include the option to change reality and to cope instrumentally with health threats by taking preventive action (Bandura, 1997; Schwarzer & Fuchs, 1997). Action beliefs and personal resource beliefs reflect a functional optimism. These beliefs show that one can change risky behavior by personal action. The second belief does not operate without the first. Therefore, it is not possible to distinguish the two empirically.

However, in making judgments about health-related goals, people usually unite personal agency with means. Perceived self-efficacy implicitly includes some degree of outcome expectancies because individuals believe they can produce the responses necessary for desired outcomes. Self-efficacy influences behavior in two ways: through intentions and directly. Behavior may not be under volitional control. If an action cannot be performed owing to a lack of resources or opportunities, then the best intentions are worthless. For example, people may intend to meet the recommended dietary intake, but perceive that realistically no healthy (organic) foods are available in a certain situation. In such instances, perceived behavioral control would be a good direct predicator of the behavior.

Researchers have shown that self-efficacy is low in the pre-contemplation and contemplation stage, and is higher in the action stage for a variety of behaviors (Prochaska, et

al., 1994). As people proceed from considering precautions in a general way towards shaping a behavioral intention, contemplating detailed action plans, and actually performing a health behavior on a regular basis, they begin to crystallize beliefs in their capabilities to initiate change. For example, determination of self-efficacy of breast self-exam, controlled drinking programs, and coping with stress illustrate that self-efficacy clearly predicts the degree of therapeutic change in a variety of settings (Bandura, 1992).

The conclusions of the researchers from the literature reviewed in this section suggest that self-efficacy is important in establishing readiness to eat healthy foods. The conclusion also supports the idea that self-efficacy beliefs are crucial to those volitional processes that transform dietary intentions into corresponding actions (the crossover stage that is hard to measure). The next section reviews literature on the measurement and characteristics of good measuring tools and instruments.

Measurement

Most research involves hypothesis testing rather than instrument development. Instrument development entails a great deal of theory development and clarification. In most cases, the absence of adequate measurements deters one from hypothesis testing. It may be that test development is not as esteemed as testing a hypothesis, even though test development entails construct validation, which is highly theoretical. Another reason could be that test development is seen as the responsibility of psychometricians (Linn, 1995). A related issue is that measurement compromises are made by brief test forms, often on the misguided premise that it is better to measure more variables poorly than a few variables well (Tyron, 1996).

Tyron (1996), in his comment about theory-driven instruments, tells us that the new ideas made possible by new instruments are almost always unanticipated by existing theory (Tyron, 1996). The new perspectives the instrument provides enable qualitative theoretical advances. "Subsequently, the new instrument is used interactively with new theoretical insights." Those instruments may provide a new perspective, which sets the occasion for qualitative changes in theory.

Instrument development is therefore an important avenue of theoretical progress. Instruments are selective in what they measure because of how they are constructed. Instruments consistently collect data in accordance with design parameters. There also is the recognition that instruments can alter theoretical understanding in many ways. Further, precise measurement of the construct related to readiness to consume grain products, fruits, and vegetables could benefit by greater sensitivity to measurement-driven inquiry.

Measures and instruments

Measurement is defined as rules for assigning numbers to objects or individuals systematically in such a way as to represent quantities of attributes (Nunnally, 1978). Various researchers postulate that one does not measure objects, but their characteristics (Maranell, 1974; Pedhazur & Schmelkin, 1991). The use of the term attribute implies that measurement is always concerned with a particular feature of objects and relations among objects in a particular dimension. Numbers are used to represent quantities concerned of and how much of an attribute is present. In some cases, measurement method may be interested in a mixture of qualities rather than one characteristic. On the other hand, each measure should concern one distinct, unitary attribute. In such cases, the implication is that to the extent

that singular attributes should be combined to form an overall appraisal, as in the case of food consumption, they should be combined rationally from different measures.

Most social measurements are indirect (Nunnally, 1978, Linn & Gronlund, 1995). The degree of the attribute of interest is inferred from an indicator it presumably affects or one with which is correlated. Because the intention of measurement is to find some underlying order in phenomena, theory of phenomena determines what attributes or aspects are to be measured and how they are to be ascertained (Pedhazur, 1993). The measure is not an end in itself, but a means in the process of description, differentiation, explanation, prediction, diagnosis, and decision making (Pedhazur & Schmelkin, 1991, p. 15). Measurement serves three major functions: establishment of a statistical relationship with a variable, representation of a specified domain of content, and a measurement of attributes. Corresponding to these functions are aspects of validity: content-related, predictive-related, and construct-related evidence of validity. However, it does not specify rules. Various methods have been applied to obtain usefulness of measurement methods, reliability of measures, validity in various senses, and the extent to which the measurement method produces interesting relationships with other measures (Nunnally, 1978; Pedhazur & Schmelkin, 1991).

Measurements of concepts within theories are evaluated for their reliability and validity (Sapp, 1998). After an instrument has been constructed, it is necessary to inquire whether it is useful. This process is referred to as determining the validity of an instrument. Validity is a matter of degree rather than an all or none property (Linn, 1995; Nunnally, 1978; Sapp, 1998). One does not validate an instrument, but rather some use to which the instrument is put (Nunnally, 1978, p. 86).

Validity

Validity is characterized as appropriateness, meaningfulness, and usefulness of the specific inferences made from test scores (American Psychological Association, 1985, p. 9; Linn, 1995; Nunnally, 1978). Test validation is the accumulation of evidence to support these inferences.

Content validity. For most instruments, validity depends primarily on the adequacy with which a specified domain of behavior indicators is sampled (Pedhazur, 1993; Nunnally, 1978). Domain specification includes definition of the target group and criteria that indicate which content should be included. Content-related evidence of validity involves checking the divisions of the constructs into small, observable, and measurable behaviors against the applicable content for the construct. For abstract constructs, it is not easy to decide on the criteria that constitute the content domain. Two standards of ensuring validity are a representative collection of items and sensible methods of test construction (Linn & Gronlund, 1995; Nunnally, 1978; Pedhazur, 1993).

Content validity also relates to a rather direct issue in scientific generalization—the extent to which one can generalize from a particular collection of all possible items that would be representative of a specific domain (Sapp, 1998). There has to be an obvious specification of content-clearly defining behaviors corresponding to constructs under study.

Several threats to content validity have been identified (Linn & Gronlund, 1995; Pedhazur & Schmelkin, 1991). Attention must be given to inadequate prior clarification of constructs. In other words, one must do a good enough job of defining (operationally) what is meant by the construct and how is this a threat. One must think through the concepts

better, clearly articulate the concepts, and let experts critique the specifics of the characteristics to be measured (Pedhazur & Schmelkin, 1991; Sapp, 1998).

Predictive and criterion-related validity. Predictive-related evidence of validity is often used to determine readiness for a specified behavior (Linn & Gronlund, 1995). In such instances, the measures are valid only to the extent that they serve prediction functions well (Linn, 1995). Nunnally has cautioned against confusing instruments that are used to predict behavior with criteria they are meant to predict (Nunnally, 1978, p. 8). Predictive validity represents a very direct way of generalizing from scores on one variable to scores on another variable. Predictive validity is determined by, and only by, some degree of correspondence between the two measures involved (Nunnally, 1978, pp. 88). In a comparison of scores, the test that correlates most strongly with a second measure is the most valid.

Construct validity. To the extent that variables are abstract, and not specific, they are referred to as constructs. They are constructs because they have been contrived from hypothesis and are not obvious. A construct represents a hypothesis that a group of behaviors are correlated with one another (Nunnally, 1978; Pedhazur, 1993).

Construct validity presumes content validity and criterion-referenced validity, but issues relating construct validity to interpretation are more complex than content and predictive validity (Bollen, 1993). Construct validity refers to the degree to which deductions legitimately can be made from the technical description to the theoretical constructs on which those interpretations were based (Maranell, 1974; Nunnally, 1978; Pedhazur, 1993). In this type one addresses whether the description, on its face, is a good reflection of the construct. This is the weakest way to demonstrate construct validity. This approach is

definitional in nature, and it presumes a good detailed definition of the construct against which the explication can be checked. The construct cannot be validated purely in terms of content validity.

According to Nunnally (1978), constructs vary widely in how extensive the scope of related observable variables is and how specifically or loosely the constructs are defined. In the development of instruments, theory is related more to the sampling of content than to the sampling of people. The larger the scope of observable characteristics, the more difficult it tends to be to define which variables do or do not belong together (Pedhazur, 1993). In contrast, many concepts are fuzzy, and researchers are unsure of their full meaning. The boundaries of the domain of related observable behavior are not clear. Because constructs concern domains of observable behavior, a better measure can be obtained by combining results from a number of measures of such indicators, rather than by taking any observation of them individually (Pedhazur & Schmelkin, 1991). Thus, by combining the scores from a number of particular pointers relating to a construct, one can increase the validity of scientific generalization over that of one pointer (Pedhazur, 1993; Sapp, 1998). Use of multiple indicators of key variables strengthens the research.

The key aspects of construct validation are specifying the domain of observable behavior (content-related validation), determining the extent to which variables tend to measure the same thing (internal consistency), and determining the extent to which supposed measures of the construct produce results which are predictable from a highly accepted theoretical hypothesis concerning the construct (Nunnally, 1978; Bollen, 1995; Sapp, 1998). These three elements of validity complement one another.

Construct validity is supported by content and predictive validity. Of course, the constructs must be measured before they can be related to one another. For the relationships among the variables to have meaning, each measure must to some degree convincingly measure what it is supposed to measure. Criterion-related validity has two forms: predictive and concurrent (Linn, 1995; Nunnally, 1978;Pedhazur et. al. 1991). Predictive validity assesses the effectual ability to predict characteristics it should be associated with hypothetically. To determine concurrent validity, one would check whether the description is a clear distinction between groups that theoretically should be different. It is the principle that measures of theoretically similar constructs should be highly interrelated.

Reliability

Another aspect of good instrument development is reliability—the extent to which a measurement procedure yields the same results on repeated trials (Linn & Gronlund, 1995; Pedhazur & Schmelkin, 1991). One can achieve reliability without validity, but validity assumes that reliability exists [under the assumption of precise measurement techniques].

To develop instruments that provide very similar measures on repeated trials, one must meet three conditions. One must define the construct as precisely as possible by describing its conceptual domain (its meaning) without confusing it with the domain of other constructs (the meaning of other constructs). Next, one must have good indicators of the construct, ones with high content validity. Finally, one must collect data with as much accuracy as is possible (Sapp, 1998). Cronbach's alpha is used to estimate internal consistency of continuous level data and KR-20 for dichotomous level data (Sapp, 1998). Alpha is the "average correlation among items in a test controlling for the number of items." From this we know that reliability will always

range between 0 and 1. The value of a reliability estimate indicates the proportion of variability in the measure attributable to the true score (Trochim, 1997). A reliability of 0.50 means that about half of the variance of the observed score is attributable to the construct and half is attributable to error. A reliability of 0.80 means that 80% of the measurement of the variability in the measurement of the scores is due to the construct and 20% to measurement error.

CHAPTER 3. DEVELOPMENT AND VALIDATION OF MEASURES OF STAGES OF CONSUMPTION, DECISIONAL BALANCE, AND SELF-EFFICACY FOR CONSUMPTION OF FRUITS, VEGETABLES, AND GRAIN PRODUCTS AMONG YOUNG ADULTS

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Abstract

The purpose of this study was to apply the Transtheoretical Model of behavior change to consumption of fruits, vegetables, and grain products among young adults 18 to 24 years old. To do so, the main objective for this study was to develop and validate measures of decisional balance, self-efficacy, and stages of consumption for fruits, vegetables, and grain products. The measures were developed by operationally defining the discrete behaviors to be measured, while qualitative interviews and theory determined the content and language for construction of items. Self-completed mail surveys were used to assess the stages of consumption, decisional balance, and self-efficacy for consuming fruits, vegetables, and grain products and behaviors related to each food. Of 800 surveys mailed to a randomly selected sample of young adults 18 to 24 years old, 116 usable questionnaires were returned. The modal stages of consumption were maintenance for fruits and vegetables and precontemplation for grain products. Factor analysis yielded two factors for decisional balance explaining greater than 40% of the variance. One component structure of self-efficacy explained 50% to 70% of the variance. To examine construct validity, the scales were studied in relation to stages of fruit, vegetable, and grain product consumption. Confirmatory factor indices (AGFI >0.80) indicated that the data on fruits, vegetables, and grain products supported adequacy, predictive value, and construct validity of the hypothesized model. The cons and self-efficacy for increased consumption were

significantly associated with stages of consumption. Differences were detected with regard to pros for increasing the consumption of grain products and vegetables. In both cases, the pros for increasing consumption were not significantly associated with stage of consumption as expressed in the transtheoretical model. The measures developed in this study exhibited adequate moderate to excellent internal consistency for cons ($\alpha > 0.70$), pros ($\alpha = 0.47$ to 0.63), and self-efficacy scales ($\alpha > 0.88$).

Key words: Transtheoretical model, stages of consumption, decisional balance, self-efficacy, instrument development, instrument validation.

Introduction

Data from national surveys describe the American diet as having too few fruits, vegetables, and grain products (Huang, Song, Schemmel, & Hoerr, 1994; Patterson, Block, Rosenberger, Pee, & Kahle, 1990). Though adequate consumption of these foods is associated with a substantially lowered risk for many chronic diseases, many Americans of all ages eat less than the recommended number of servings (United States Department of Agriculture, 1992). This gap between recommended and actual food intake implies that past methods of delivering nutrition messages have not been effective in promoting positive behavioral changes. This awareness calls for different methods of defining, measuring, and monitoring changes in nutrition behavior.

There are several issues related to the measurement of food behaviors. Although the success of nutrition education efforts rests on individuals adopting and maintaining specific food consumption behaviors, few programs are grounded in theories of behavior change (Galavotti, Cabral, Lansky, Grimley, Riley, Prochaska, 1995). The development of such intervention programs is hampered by a lack of frameworks for determining which factors can be altered through intervention and for measuring program effects. Therefore, the purpose of this study

was to evaluate the applicability of the Transtheoretical Model (TMM) of behavior change (DiClemente & Prochaska, 1982, DiClemente, Prochaska, & Gilbertini, 1985; Prochaska, DiClemente, & Norcross, 1992a; Prochaska, Redding, & Evers, 1997a) to the measurement of readiness to increase consumption of fruits, vegetables, and grain products among young adults.

The Transtheoretical Model of behavior change was chosen to design this study because it (a) presents a way of conceptualizing and measuring behavior change, (b) has been successful with most health behaviors, and (c) integrates key concepts from several important theories of human behavior to explain how and why change occurs. Despite the growing interest in use of TTM for designing, monitoring, and appraising interventions, few attempts have been made to systematically develop and authenticate self-report measures assessing food consumption (Greene, Rossi, & Reed, 1996; Sandoval et al., 1996; Sigman-Grant, 1996).

Because a questionnaire appropriate for this study could not be located, it was necessary to develop one. Therefore, the first objective of the study was to develop and validate an instrument to represent each of the constructs of decisional balance, self-efficacy, and stage of consumption for fruits, vegetables, and grain products. A second objective was to determine how the three constructs of the transtheoretical model relate relative to readiness to increase the consumption of fruits, vegetables, and grain products among young adults. The hypothesized model was expected to hold for fruits, vegetables, and grain products.

Several cognitive factors, including stage of change, decisional balance, and self-efficacy, have been identified as important variables to consider in assessment of behavior modification (Bandura, 1977; Jannis & Mann, 1977; Prochaska, 1985, Prochaska & Velicer, 1997a; Prochaska & Velicer, 1997b). The stage of change construct represents a temporal dimension, with motivational, and constancy aspects of change, and at least five distinct stages for most

behaviors (Cardinal, 1997; Prochaska & Velicer, 1997b). People may be in precontemplation (yet to consider the desired behavioral change and having no intention to change behavior within six months), contemplation (considering change within six months), preparation (small inconsistent changes and actually planning change), action (active involvement in the behavior for less than six months), and maintenance (having been active in the behavior for more than six months) (Brug, Glanz, & Kok, 1997). In the maintenance stage, individuals are less tempted to relapse and are increasingly more confident they can continue the desired behavioral changes. Consistent with the stages of change construct, all modifications toward behavior, as well as explicit actions, are taken into account (Prochaska, 1985, 1992).

The stage of change construct reflects the varying degree of progress toward long-term positive behavior and is the central construct in TTM. Implicit in the stage of change construct is that behavior change is a progressive, continuous, and dynamic process. Besides the obvious actions, the stages of desire to change (intention) are assessed. It is important to recognize that different stages of consuming the recommended number of servings of foods exist, and to identify reasons for these differences among young adults. Like most chronic behaviors, the stages of change are both stable and open to change (Prochaska, Redding, & Evers, 1997b). That is, if no cognitive factors are modified, no change occurs. Otherwise, shifts in cognitive factors will trigger changes.

In the use of the TTM for behavior change, people in each stage must attain a criterion that scientists agree is sufficient to reduce risks (Reed, Velicer, Prochaska, Rossi, & Marcus, 1997). In this study, the recommended number of servings based on the Food Guide Pyramid (FGP) was used as the criterion for adequate consumption (USDA, 1992). The stage of

consumption was determined in terms of the number of servings per day, the length of time of consumption, and the intention to increase consumption.

Self-efficacy, the situation-specific confidence in one's ability to avoid or perform a behavior without relapsing, also has been strongly associated with stage of change (Bandura, 1977; DiClemente, 1986; Prochaska, Redding, & Evers, 1997b). For example, self-efficacy has been associated with the performance of many health behaviors, including condom use and weight loss (Galavotti et al., 1995).

Decisional balance reflects an individual's weighing of the pros and cons of changing a behavior (Jannis & Mann, 1977; Prochaska, Redding, & Evers, 1997a; Velicer, Rossi, DiClemente, & Prochaska, 1996). Several studies have illustrated that the balance between the pros and cons varies, depending upon the stage of change (Prochaska et al., 1994; Reed, et al., 1997).

This paper reports the factor structure of the sub-scales, test of internal consistency, and predictive validity of the TTM for food consumption data. First, the instrument development and measurement procedures are described. Second, factor structures of the decisional balance and self-efficacy are presented. Third, internal consistency of each of the sub-scales is reported. Finally, the predictive validity of the stage of consumption for fruits, vegetables, and grain products with respect to decisional balance and self-efficacy was evaluated and reported.

Research Design and Methodology

Defining and specifying the constructs

Qualitative interviews. Qualitative interviews were conducted with 104 young adults from ten states in April 1996. The sample was purposively selected to include females and males who were both students and non-students and from different ethnic backgrounds. Data from

the qualitative interviews were analyzed to identify content and language used by young adults (Appendix I) and to provide the content and language for the definition of constructs of interest. Simultaneously, an extensive literature review was conducted on the stages of change theory and related constructs.

Selecting a conceptual framework. What is relevant to measure can be determined only within an implicit or explicit theory about the phenomenon one wishes to measure (Pedhazur & Schmelkin, 1991). This study used the TTM to determine systematically the stage of consumption, pros, and cons, and self-efficacy for increasing consumption of fruits, vegetables, and grain products. Data from qualitative interviews with young adults indicated that young adults' view fruits, vegetables, and grain products differently and their intake patterns for these foods are different. Qualitative data also illustrated that perceptions and behaviors of young adults relative to these foods differed. Other studies have shown the same results for different populations (Krebs-Smith, Krebs-Smith, Heimendinger, Patterson, Subar, Kessler, & Pivonka., 1996; United States Department of Agriculture, 1992; Welsh, 1994). Therefore, this study assessed the stage of consumption of each food separately because the specificity with which the FGP defines the criteria for adequate consumption differs.

Defining the constructs. A prerequisite to defining a construct is the knowledge of theories and data relevant to the construct under consideration. To assess the applicability of the TTM to food consumption, Nunnally's (1978) principles for the measurements of constructs were applied. The discrete criterion behavior was the consumption of the recommended number of fruits, vegetables, and grain products servings as defined by the Food Guide Pyramid (FGP). The constructs of stage of consumption, decisional balance, and self-efficacy were defined operationally to reflect behaviors related to food consumption of young adults. A

decision was made to include definitions, examples, and recommended number of servings in the survey to ensure that the respondents and researcher had a shared meaning of the concepts.

Determining use of the instrument. The purpose of the study was determined as identifying young adults' readiness to increase consumption of fruits, vegetables, and grain products. This study was based on a specific population's perception of food and factors that influence food choice. The target audience was young adults between the ages of 18 and 24. Studies with this age group showed that young adults consume exceptionally small amounts of fruits, vegetables, and grain products (Georgiou, et al., 1997; Keim, Stewart, & Voichick, 1997). Further, the fruits, vegetables, and grain products they do consume are limited in variety and to a few food items from each food group (Georgiou, et al., 1997; Huang, et al., 1994; Keim, et al., 1997).

Young adults are at a critical stage of development. They are making the transition from parental control of their food intake to being responsible for their own and possibly their children's as well (Lau, Quardel, & Hartman, 1990; Mitchel, Herzler, & Webb, 1994). The food habits formed by young adults at this stage also will become a foundation for future practices that will affect their health throughout life. Of even greater concern is the fact that food behaviors adopted at this stage may become lifelong habits.

Instrument development

The instrument development process drew on responses from qualitative interviews and the extended review of literature. Item construction took into consideration the fact that food consumption and food choices occur in a context broader than the eating of a food in itself—including planning, shopping, available income, time, food preparation skills, food storage space, and marital status. Although not strictly features of food consumption, situational factors can be

associated with many food choices. Items were constructed to reflect a broad array of circumstances. Once the constructs were defined in behavioral terms, the next step involved identifying ways to measure them.

Multiple items on each sub-scale were developed to provide a more comprehensive profile to support construct validity for the scales (Bollen, 1993). Attempts were made to make the items concur with major concepts and with the theoretical definition of concepts. Eventually, the instrument evolved into four components. The draft instrument included items on (a) demographic information, (b) stages of change, (c) decisional balance, and (d) self-efficacy.

After the item pool was constructed, a subset of the items was selected for inclusion in a pilot-test. The pilot survey was composed of 98 items. Relative to the categories of the constructs, the items were distributed as 43 for decisional balance, 40 for self-efficacy, and 15 for staging (five items for each of three foods). To reduce this initial pool of items, the items were reviewed for meaningful content. Only those items agreed on were retained, resulting in 78 items.

Scales

Stages of consumption algorithm. The development of the stage of consumption items involved a discrete definition of the criterion behavior for adequate consumption. A constructed index of stages of consumption algorithm consisted of five items. The items on the staging tool assessed the reported level of current consumption for each food, and for consistency of consumption and duration of consumption at a reported level. For those reporting consumption lower than the criterion consumption, both long- and short-term intention for increasing consumption to the recommended number of servings per day also were

assessed. All participants were asked to respond with "yes" or "no" to items evaluating how many numbers of servings per day they ate of each food. Consistent with FGP, the number of servings differed according to the food group. With regard to the behavioral intentions, participants were to respond with "yes" or "no" to the intention to increase consumption in six months or in 30 days. The stages of consumption were evaluated as follows:

1. Precontemplation: Consumption is lower than the recommended number of servings, with no intention to increase consumption in the next six months.

2. Contemplation: Consumption is lower than the recommended number of servings, with no intention to increase consumption in the next 30 days.

3. Preparation: Consumption is lower than the recommended number of servings, with an intention to increase consumption in the next 30 days.

4. Action: Consumption is equal to or higher than the recommended number of servings, and consumption has been at that level for less than six months.

5. Maintenance: Consumption is equal to or higher than the recommended number of servings and consumption has been at that level for more than six months.

Decisional balance. Decisional balance is a summary index that refers to the perceived relative weighing of the advantages (pros) and disadvantages (cons) of consuming more grain products, vegetables, and fruits. Developing the scales for the decisional balance construct also drew on responses from the in-depth interviews. The items on decisional balance represented global pros and cons for consuming fruits, vegetables, and grain products as expressed by young adults through the qualitative interviews.

The pros and cons highlighted respondents' perceptions of barriers and benefits important in their decision to increase consumption of fruits, vegetables, and grain products.

Initially 43 items were developed. The importance of each variable in the decision to increase consumption to the recomended number of servings of grain products, vegetables, and fruits was assessed on a five-point scale ranging from one to five (not important at all to very important). For the revised version, an effort was made to balance the number of pros and cons and to randomize the order in which they were presented on the scale.

Self-efficacy. Self-efficacy is situation-specific confidence that young adults can consume the recommended amounts of grain products, vegetables, and fruits per day, irrespective of their situation. Items for measuring self-efficacy were developed using the same method as for the decisional balance scale. Self-efficacy must be as situation-specific as possible to relate to a distinctive behavior (Bandura, 1977; Marlatt, 1994). To achieve this substantial sense in the instrument, self-efficacy questions were tailored to typical and challenging situations that young adults encounter relative to food choices. On the self-efficacy scale, the participants were presented with common situations that may challenge their ability to consume the recommended number of fruits, vegetables, and grain products servings in different situations. Participants were asked how confident they were about consuming the recommended number of servings from each food group in both typical and particular situations. Response options ranged from one to nine (not confident at all to very confident).

Pre-testing and revision

Expert judges familiar with nutrition education and instrument development reviewed the instrument for content, wording, format, and overall quality. After content validation, the instrument was pilot-tested with 25 young adults in Iowa. The respondents found the instrument to be short and easy to follow. Principal components extraction using the SPSS version 8.0 (SPSS, Inc., 1990) was conducted to study the relationships, determine adequacy of

the items, and set criteria for reduction and modification of the initial pool of items for the decisional balance and self-efficacy scales.

All items with a factor loading less than 0.40 were dropped. Based on factor analysis and comments from the respondents, items that were repetitive, unclear, or loaded on more than one factor either were reworded or dropped. Because of time and cost constraints on the survey length and the comments from the participants on the pilot study, it was not desirable for the pool of items to be larger than 20 for either the decisional balance or self-efficacy scales. Further, item reliability of the scales was assessed for internal consistency using Cronbach's alpha. Because repeatability is central to reliability, a specific number of items were retained to provide for a high level of internal consistency. In some cases, deleting some items would have compromised content validity.

Scoring scale. The definition of the construct was the most important guide to the development and selection of the items. Decisions about the scoring scale could not be made without consideration of the construct for which the item was meant to be an indicator. The scoring scales had to reflect the definition of the construct. In the revised version, each of the three constructs had a unique scoring scale.

Data Collection

A sample of 800 young adults from Iowa, age 18 to 24, was selected randomly from a consumer mailing list (American Consumer Lists, Inc. 1998). The surveys were sent out between March and August 1998. The questionnaire covered items on stages of change, decisional balance, self-efficacy, and general information. One hundred and sixteen usable questionnaires were analyzed for a return rate of 14.5%.

Data analysis

Content validation. Content validation determined the extent to which sampling of the questions reflected the intended description of the three constructs.

Statistical analysis. Data from the mail survey were coded, entered, and analyzed using SPSS version 8.0 (SPSS, Inc., 1990). A two-step process was used. The first step consisted of exploratory principal axis factor analysis to examine the component structure of the two constructs. For the second step, confirmatory factor analysis for the reduced scales was performed. Finally, a reliability estimate was assessed for the decisional balance and self-efficacy sub-scales using Cronbach's alpha. Univariate frequency distribution was conducted to describe the demographic characteristics of respondents. Table 1 summarizes the background characteristics of the 116 respondents who completed the questionnaire.

Results

Table 1 shows information about the respondents. Of the 116 respondents (14.5%), 67.9% percent were female. Ages of the sample ranged between 18 to 24 years. More than 50% were above 22 years of age. The sample consisted of 62% full-time students, 7.4% part-time students, and 20.4% non-students. Ten point two percent had graduated from college. Approximately 35% lived in places they rented with others, 27% lived at home with parents, 26.1% lived in residence halls, and only a small percent lived alone (8.1%), or in a sorority/fraternity (3.6%). The majority (78.4%) reported they had never married, and 16.2% currently were either married or living as married. The rest were either married with children (2.7%), separated (0.9%), or divorced (1.8%). About 48 percent resided in cities, 21.8% in suburbs, and 29.5% in rural areas. Reflecting the local area, 91.1% were white, 1.8% African

Table 1. Demographic characteristics of respondents[a]

		%
Gender	Male	32.1
	Female	67.9
Age	18	2.7
	19	16.4
	20	14.5
	21	12.7
	22	20.9
	23	13.6
	24	19.1
Living Arrangement	Residence halls	26.1
	At home with parents	27.0
	Rent with others	35.1
	Living alone	8.1
	Sorority/fraternity	3.6
Relationship status	Never married	78.4
	Married or living as married	16.2
	Married with children	2.7
	Separated	.9
	Divorced	1.8
College status	Full-time	62.0
	Part-time	7.4
	Non-student	20.4
	Graduated from college	10.2
Residence	City	48.7
	Suburb	21.8
	Rural	29.5

[a] N=116

Table 1. (continued)

Race	African American	1.8
	Native American	0.9
	White/Caucasian	91.1
	Other combination	6.3
Hispanic	Yes	24.1
	No	75.9
Amount spent on food	<$50	19.8
per month	$50-100	31.5
	$100-150	40.5
	$200-300	2.7
	>$300	5.4
Income per annum	<10,000	62.2
	10,000-14,999	17.1
	15,000-19,999	6.3
	20,000-24,999	8.1
	25,000-29,999	2.7
	30,000-34,999	3.6

American, 0.9% Native American, and 6.3 % racially mixed. About 24 % of the sample reported they were of Hispanic origin. The majority (62.2%) earned an income of less than $10,000. About 17% earned $10,000-14,999, 6.3% earned $15,000-19,999, and 6.3% $15,000-19,999, 8.1% earned $20,000-$24,999, 2.7% earned $25,000-29,999, and 3.6% earned $30,000-34,999. The amount of money spent on food per month ranged from less than $50 (19.8%), $50 to 100, (31.5%) to $100 to 200 (40.5%), $200 to 300 (2.7%) and greater than $300 (5.4%).

Evaluating the TTM constructs

Allocation of stages. A good staging algorithm is based on a discrete behavior and defines the behavior clearly. It also allows self-assessment (Reed et al., 1997). The distribution

of the respondents into stages of consumption is displayed in Figure 4. The distribution for stage of fruit consumption was 23.6% precontemplation (PC), 13.5% contemplation (C), 22.6% preparation (PRE), 2.5% action (A), and 37.8% maintenance (M). For vegetable consumption, the distribution was 27.9% P, 14.0% C, 17.6% PRE, 11.6% A, and 28.9% M. Stages of grain products consumption was distributed as 47.8% PC, 5.3% C, 13.9% PRE, 10.4% A, and 22.6% M.

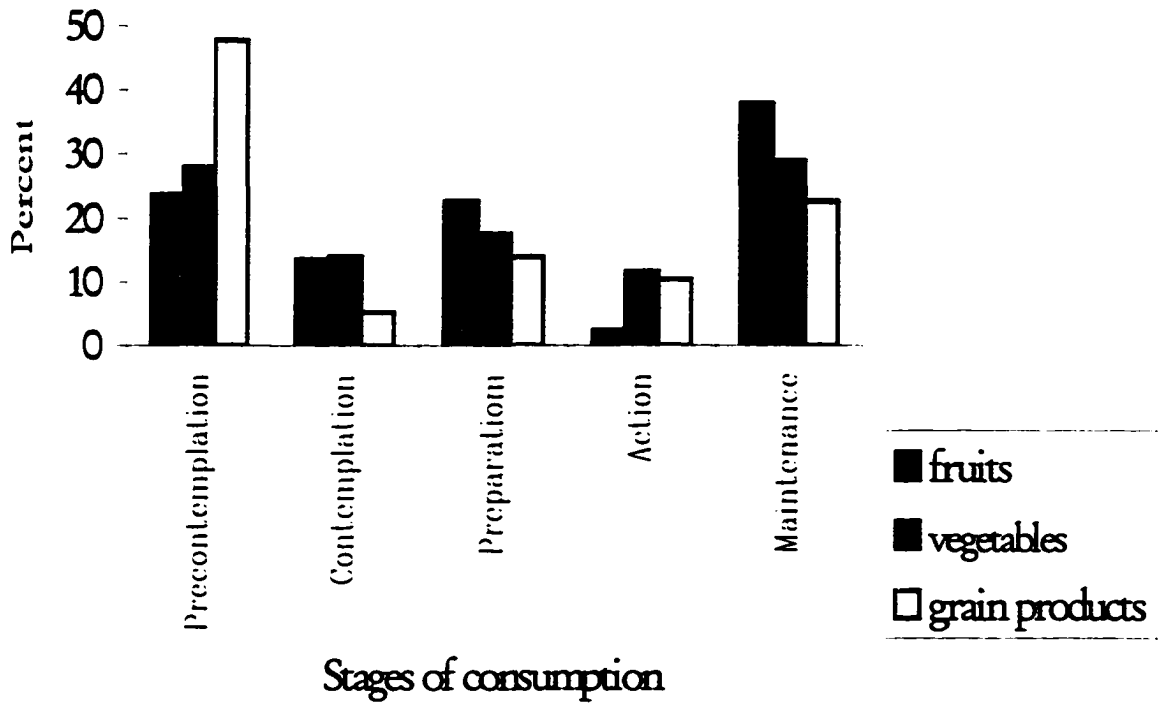

Figure 4. Placement of respondents into stages of consumption

Factor analysis. Separate principal axis factor analysis with equamax rotation was executed using data for fruits, vegetables, and grain products to examine the factor structure of the decisional balance and self-efficacy scales. Interpretability of the components, the extent to which items loaded uniquely on a factor, and the variance explained by the factors determined the number of components to be retained.

Using 0.40 factor loading as the cut off point, two distinct components were expected for the decisional balance scale, pros and cons of increasing consumption. The analysis revealed two clearly interpretable factors. The two-factor structure for decisional balance explained about 41% of the variance for vegetables, 45% for fruits, and 46.3% for grain products. The one-component structure for self-efficacy explained 73% of the variance for fruits, 64.3% for vegetables, and 53.3% for grain products. Table 2 presents the factor loadings for the self-efficacy scale.

Items that did not load on either component or factor and those that loaded on more than one factor were removed. The following items did not load for self-efficacy: making time to eat the foods, learning to like the foods, tracking the number of servings consumed, trying to eat the foods more often, knowing the number of recommended servings for each food, and eating more of the foods when with others. Items with a factor loading higher than 0.5 on a single factor were retained for use in further analysis; 13, 12, and 11 items were retained for fruits, vegetables, and grain products respectively. The decisional balance construct loaded on two factors, as illustrated in Table 3. A big difference was noticeable in the decisional balance scales among the three foods. The pros for increasing consumption of grain products loaded on five items: grain products are easy to pack, would be satisfying, make easy snacks,

Table 2. Factor analysis of self-efficacy scale[a]

I am confident that I	Fruits	Vegetables	Grain products
can make effort to take F/V/G[b] to school	.819		.630
can eat F/V/G at least once a day	.786	.649	.574
can choose F/V/G for snacks	.774	.530	.654
can eat RNS[c]/day of F/V/G	.774		.680
can RNS of F/V/G on while on my own	.770		
can shop for a variety of F/V/G all year	.768	.530	.646
can consume RNS from a few F/V/G that I like	.762	.523	.547
can eat more of F/V/G When I am at home	.757	.516	.531
can eat RNS servings/day of F/V/G	.731	.688	.660
when I eat outside home, I can eat the RNS of F/V/G	.710	.559	.699
can keep F/V/G on hand	.705	.635	.722
can RNS of F/V/G on a limited budget	.677	.577	.716
can make time to prepare F/V/G	.616	.631	
can try to eat F/V/G more often	.518		
can eat more of F/V/G when I eat with others			
can eat RNS when faced with choices of F/V/G		.755	.697
can prepare F/V/G with limited equipment		.610	.503
can tell how many F/V/G I ate today			
can learn to like more F/V/G			
know the RNS for F/V/G			

[a] Factor loadings less than 0.5 are not reported, [b] Fruits/vegetables/grain products,
[c] Recommended number of servings.

Table 3. Factor analysis of decisional balance scale[a]

Importance of factor in my decision to increase consumption of	Grain products		Vegetables		Fruits	
	Cons	Pros	Cons	Pros	Cons	Pros
I would have limited access to			.434			
F/V/G would add variety						
It would be difficult to get foods that I like from F/V/G	.762		.762		.667	
I would have limited ways to prepare a variety of F/V/G	-.727		.549		.541	
F/V/G contain too many chemicals	.711		-.746		.838	
My risk for heart disease would decrease if I ate more F/V/G						
It requires too much time to eat F/V/G	-.601		.804		.592	
It is hard to incorporate F/V/G into a meal	-.562		.552		.556	
I dislike the texture of F/V/G	.				.661	
I would feel healthier if I ate more F/V/G				.441		.515
F/V/G would be satisfying		.651		.766		.575
F/V/G would be easy to pack for a lunch		.614				.762
F/V/G add variety		-.597				
F/V/G are easy snacks		.587				.788
Would require too much time to plan for F/V/G	-.460		.690		.642	
F/V/G would replace foods high in sugar and fat		-.577		.462		.672
F/V/G would prevent irregularity				.683		
F/V/G foods would help maintain a healthy weight				.553		.512
I would not have enough money to buy F/V/G			.456			
I would not have time to prepare F/V/G						

[a] Factor loadings less than 0.40 are not reported, [b] Fruits/vegetables/grain products, [c] Recommended number of servings.

add variety, and would help maintain a healthy weight. The following items loaded on pros for vegetables: maintaining a healthy weight, add variety to the diet, prevent irregularity, would be satisfying, and would make them feel healthier. The pros for fruits related to being easy to pack for lunch, can replace foods high in sugars and fats, would help maintain a healthy weight, would be satisfying, easy snacks, and would make them feel healthier. Several cons were common to all the foods-having limited ways to prepare a variety, contain too many chemicals, difficulty to get foods one likes from the foods: hard to incorporate in a diet, and require too much time to eat. The items related to not enough money, limited access to the foods, and too much time required planning for, loaded as cons for vegetables. Five pro items and five con items for fruits and vegetables, and four pro items for grain consumption, were retained for use in subsequent analysis.

Confirmatory factor analysis

Confirmatory factor analysis (CFA), using maximum likelihood estimation in SPSS Version 8.0 Analyis of Moments Structure (AMOS) (SPSS Inc., 1990), was performed to assess the fit of the data with the hypothesized model. The confirmatory factor analysis models produced satisfactory indices of fit. The goodness of fit index (GFI) and adjusted goodness of fit index (AGFI) are acceptable and range between 0.792 and 1 for the three food groups. Authors have suggested those AGFI values of 0.80 and above are usually indicators of acceptable fit (Bentler, 1990; Pedhazur & Schelmkin, 1991). The standardized root mean residuals (RMR) value was low for all the three food groups. The closer to zero the value is the better the fit of the model for the data. The t ratios for the constructs in the fruit consumption model indicate that pros (C.R.= 2.4), cons (C.R.=-4.1), and self-efficacy (C.R.= 4.5) were significantly associated.

Table 4. Goodness of fit indices

Food group	Fruits	Vegetables	Grain Products
X	15.6	11.54	9.25
GFI	0.94	0.95	0.96
AGFI	0.79	0.88	0.86
RMR	0.09	0.13	0.00
C.R Cons	-4.15	5.57	-7.17
C.R. Pros	2.3	0.25	1.4
C.R. Self-efficacy	4.5	1.710	4.3

Because TTM suggests that cons and pros vary with stages of consumption, predictive validity was evaluated by the squared multiple correlation (SMC) accounted for by the stages of consumption on each of the constructs. The variance explained in the model was 13.6% for cons, 4.6% for pros, and 15.8% for self-efficacy.

Pros (C.R=0.25) and self-efficacy (C.R=1.7) were not significantly explained by placement in stages of vegetable consumption. The cons (C.R=5.6) of increasing vegetable consumption were significantly associated with the stage of vegetable consumption. The variance explained in the model was (SMC) 16.4% for cons, 0.5% for pros, and 5.1% for self-efficacy.

With regard to grain products consumption, the pros (C.R=1.4) were not significantly explained by placement in a stage of consumption. The cons of increasing grain products consumption (C.R=-7.2) and self-efficacy (C.R=4.3) were significantly associated with stage placement. The variance (SMC) in con scores, pros, and self-efficacy for grain products explained in the model was 32%, 1.7%, and 4.2% respectively.

The confirmatory factor analysis indices showed that most of the variation and covariation in the data is explained by relationships of the constructs in the model. These findings show different relationships among constructs for each food group. Self-efficacy is more highly related to stage of consumption than the pros and cons were. However, the relative combined effect of the three constructs emphasize the importance of TTM as an integrated set of the constructs. The multivariate TTM model is important because it takes into account the fact that the different variables become important at different points during the change process.

Internal consistency

Table 5 shows the reliability for self-efficacy, con, and pro scales for fruits, vegetables, and grain products. Cronbach's alpha for the con scales for fruits, vegetables, and grain products

Table 5. Internal consistency of the sub-scales

Scale	Variable	No. of items	Std item alpha	Scale mean	Item means	Item variances
Fruits	Pros	5	0.6275	14.59	2.91	0.1754
	Cons	5	0.7841	10.33	2.066	0.0900
	Self-efficacy	13	0.9383	85.72	6.59	0.8331
Vegetables	Pros	5	0.4718	17.11	3.42	0.4076
	Cons	6	0.7935	12.86	2.144	0.2419
	Self-efficacy	12	0.8794	80.25	6.687	0.3433
Grain Products	Pros	5	0.5736	13.52	1.71	0.1356
	Cons	4	0.7049	7.76	1.91	0.5801
	Self-efficacy	11	0.8922	81.00	7.36	.2038

were 0.78, 0.79, and 0.70 respectively. Reliability coefficients for the pro scales for fruits, vegetables, and grain products were 0.63, 0.47, and 0.57 respectively. For the 13, 12,and 11 item self-efficacy scales for fruit, vegetable, and grain products the coefficients were 0.94, 0.88, and 0.89. The scales for self-efficacy and cons had high internal consistency, whereas the pro scales had adequate internal consistency.

Summary and Discussion

A good staging algorithm should be based on a discrete behavior, define the behavior clearly, and allow self-assessment (Reed et al., 1997). The results of this study indicate that the stages of change algorithm and constructed index was a useful and reliable tool to assess stages of consumption for fruits, vegetables, and grain products. The index sorted the young adults into stages of consumption that are consistent with stages of change— precontemplation, contemplation, preparation, action, and maintenance. The relative placement into the stages of consumption differed by the food group. These stages of consumption distinguish among those who are undecided, those who were deciding to change, those preparing to change, those acting, and those who were meeting the criterion consumption level.

Changes that differ by variables confirm a stage process or a non-linear continuum process. If the magnitude of differences on a variable vary across stages, and if the patterns of change differ from one variable to the next, the data suggest a stage model (Weinstein, Rothman, & Sutton, 1998). These findings indicate that distinct stages of consumption determined by current consumption and long and short-term intentions to increase consumption can be assessed accurately. Identifying the stage of consumption provides an opportunity to develop stage-matched interventions (Prochaska, & Velicer, 1997b; Sandoval et al., 1996).

Factor analysis of the decisional balance and self-efficacy scales indicated that the reduced sub-scales differed for each specific food group, confirming that consumption of fruits, vegetables, and grain products do constitute different behaviors. The respondents' self-confidence to consume recommended amounts of fruits, vegetables, and grain products was sensitive to changes in stages of consumption. That is, self-efficacy increased from precontemplation to maintenance stage. The self-efficacy scale explained a variance greater than 50% for each of three food groups.

Support for relative weighing of advantages and disadvantages of increasing consumption of the food groups also was evident. The items measuring respondents' ease of access to the foods and benefits gained by consuming more of the foods loaded as advantages (pros). Conversely, if the individuals felt they would have no time or money, and found it hard to incorporate the food groups into their diets, then the items loaded as cons or disadvantages. More of the con items had higher factor loading scores than did the pro items, indicating that cons are more important in the decision to increase consumption of these foods than the pros are.

The data from this study support the notion that barriers differed slightly for each food group, confirming the hypothesis that the perceptions about, and subsequent consumption patterns for, the three food groups differ. Items on the perceived disadvantages were similar for the three foods groups, but those on perceived benefits of increasing consumption of each food group varied. The two-factor component of decisional balance explained greater than 40% of the total variance of fruits, vegetables, and grain products. This finding is consistent with other health behaviors where the two-component, decisional balance structure accounted for 40 to 80% of the total variance (Prochaska et al., 1994).

Results from the confirmatory factor analysis show that the stages of consumption construct was significantly associated with pros, cons, and self-efficacy. They support the predictive power and construct validity of the sub-scales as well as the transtheoretical model. The model illustrates that these constructs are significantly associated with the stages of consumption (Prochaska, Redding, & Evers, 1997b). Comparing individuals on variables that differentiate stages of consumption validates the accuracy of placement in the stages of consumption and accuracy of the staging algorithm. This means that the staging algorithm has utility in different settings.

The goodness of fit indices for the scales were greater than 0.80 for the three food groups, indicating that much of the variation and covariation in the data are explained by the TTM. These findings show different patterns for each food group. Self-efficacy is more highly related to stage of consumption than the pros and cons for increasing fruits, vegetables, and grain products. This trend is consistent with Bandura's (1977) theory that the confidence to engage in a current behavior is significantly related to actual behavior. In the confirmatory factor analysis, the t-ratios for the pro scales were not as strongly associated with stages of consumption as were those of the cons and of self-efficacy, except for fruit consumption. With regard to fruit consumption behavior, the three constructs of pros, cons, and self-efficacy were predicted significantly by the stage of consumption. The data on fruit consumption behaviors fit best with the transtheoretical model. The pros and cons for the vegetables and grain products were not significantly associated with stages of consumption.

These deviations of the relationships from the hypothesized model could mean that the pros or cons were not measured well, or that the stages of consumption were not measured well, or that food consumption does not fit the TTM as accurately as other health behaviors. It

is possible that neither of the measures captured the domain constructs adequately. On the other hand, the cons could have measured well, but the items on the pro scales measured poorly. This calls for further research and refinement of the decisional balance scales. However, the relative combined effects of the constructs of cons, pros, and self-efficacy contribution to significant overall goodness of fit indices emphasizes the importance of TTM as an integrated set of constructs.

Overall, the results support the integrative nature of the TTM. Self-efficacy and decisional balance were significantly associated with stages of consumption and results from this study established predictive validity of the stages of consumption for cons, pros, and self-efficacy. The multivariate nature of TTM is important because it takes into account that different variables become important at different points during the change process, and that different behaviors are associated with the three food groups.

The value of Cronbach's alpha for the instrument and sub-scales was greater than 0.70 for the con scales, was 0.47 to 0.70 for pro scales, and was 0.80 to 0.99 for self-efficacy scale, indicating adequate to excellent reliability of the measures and sub-scales developed in this study (Pedhazur & Schmelkin, 1991). These scales reliably and appropriately can track changes in readiness to increase consumption of fruits, vegetables, and grain products. The internal consistency for the pro scales was lower than that for the con scales. This finding suggests that "cons" may be similar for most young adults. However, the perceived "pros" for increasing consumption of these foods may be more individually specific.

The results from this study have implications for both measurement and intervention. Although the TTM model seems to fit data related to the three food groups, it is important to investigate the behaviors further with larger samples, other food groups, and other target

audiences. Replication of the study with other samples would build data regarding validity for the application of the TTM model to broader food consumption situations and behaviors. Clearly, the self-efficacy scales have excellent items. Items with factor loadings greater than 0.60 are indicators of stable measures (Sapp, 1998). Methodologically, the decisional balance tool has problems and needs revision. The instrument may not have tapped key elements of actual and perceived advantages for increasing consumption of the food groups.

Small changes in the measurement procedures can make a large difference. It is possible that people chose or indicated the middle choice as "important." Inclusion of contingency questions could investigate further whether important factors are perceived to be important as barriers or facilitators of increased consumption. Definitional problems resulting in basic reliability and validity concerns also have been cited (Velicer, Rossi, Prochaska, & DiClemente, 1996). Problems could arise from employing outcome measures that do not have a precise definition. The constructs of and subsequent operational definitions of pros (advantages) and cons (disadvantages) for consuming foods from any of the food groups may need to be revised and confirmed to make them as food group specific as possible. Explicit and obvious definitions of the decisional balance constructs may shed light on reasons for the lower reliability coefficient (Cronbach's alpha) for the pro scales. The improved scales would subsequently be more accurate for use in the designing of and evaluating nutrition education programs.

CHAPTER 4. RELATIONSHIPS AMONG DECISIONAL BALANCE, SELF-EFFICACY, AND STAGES OF CONSUMPTION FOR FRUITS, VEGETABLES, AND GRAIN PRODUCTS

A paper to be submitted to the Journal of Health Psychology

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Abstract

The objective of this study was to examine the relationships among the stages of consumption, decisional balance (pros and cons), and self-efficacy for fruits, vegetables, and grain products in relation to the Transtheoretical Model (TTM) of behavior change. Eight hundred young adults, 18 to 24 years old were selected randomly from a consumer mailing list, with a return rate of 14.8%. The mail questionnaire included 5 items to measure stages of consumption, 20, 20, and items on decisional balance, self-efficacy, and general information respectively. One hundred and sixteen usable questionnaires were returned. A constructed index was used to sort respondents into stages of consumption. Principal axis factor analysis with varimax rotation was conducted for all the self-efficacy and decisional balance items. Factor-based scores for pro, con, and self-efficacy scales were saved using the regression option. Decisional balance scores were computed as the difference between the pro and con scores. Three multivariate analyses of variance were performed with stages of consumption as the grouping variable and the pro, con, and self-efficacy scores as dependent variables. The pro and self-efficacy generally increased from the precontemplation to contemplation stages whereas con scores decreased. Consistent with the TTM, decisional balance and self-efficacy differed by stage of consumption. However, the relationships among the constructs at the action stages for fruits and vegetables did not support the TTM.

Keywords: transtheoretical model, stages of consumption, decisional balance, self-efficacy, food consumption, young adults.

Introduction

Consumption of foods from plant origin among young adults has overlapping problems, similar behavioral causes, and potentially similar behavioral interventions. Results from national and regional surveys show that the typical 18 to 24 year old has a diet nearly lacking in vegetables. Their diets also are likely to be low or less than average low in fruits and grain products (McDowell, Greene, Caughman, Briefel, Loria, & Johnson, 1992; Harnack, Block, Subar, Lane, 1998; Kant, Block, Schatzkin, & Nestel, 1991; Murphy, Rose, Hudes, & Viteri, 1992; Patterson, Block, Rosenberger, Pee, & Kahle, 1990). Given the reported under-consumption of these foods and the limited variety of foods consumed, it is important to investigate the factors associated with these behaviors. In this study the consumption of these foods as linked phenomena that demand simultaneous understanding and attention is considered.

One method identified as crucial to promoting the making of appropriate choices is the use of decisional aids. Decisional conflict, a state of uncertainty about the course of action to take, tends to occur when choices that are being made that involve risk, significant gains and losses—decisional balance, and anticipated regrets over positive aspects of rejected tradeoffs (O'Connell & Velicer, 1988). Decision-supporting interventions have the potential to reduce decisional conflicts.

Related to making choices is an individual's feeling of adequacy to deal with a situation—self-efficacy (Bandura, 1977). The purpose of this study was to examine the relationships among

three major constructs of the transtheoretical model of behavior change (TTM): the stages of consumption, decisional balance, and self-efficacy.

The TTM describes the relationship among several concepts with the stage of change as the central organizing construct in the model (Prochaska & Velicer,1997a, Prochaska, 1985). Through the TTM researchers have demonstrated that both the cessation of high-risk behaviors and the acquisition of healthier alternatives involve progression through stages of change. Normally, the definition of stages of change integrates behavior-to-date with intention to change the current behavior (Rakowski, Fulton, & Feldman, 1993).

Several dependent and intervening variables have been associated with the stages of change (Prochaska, 1985). Previous studies have found an integral relationship between stages of change dimension and outcome variables such as decisional balance, self-efficacy, and temptation (Fava, 1997; Prochaska, 1985; Prochaska & DiClemente, 1992; Prochaska, Redding, & Evers, 1997b). These constructs, however, have not been applied to the consumption of fruits, vegetables, and grain products.

The construct of decisional balance reflects an individual's relative weighing of the benefits (pros) and disadvantages (cons) of performing a behavior or changing a high-risk behavior. The decisional balance is a summary index derived from two variables: the pros and cons of changing a behavior (Prochaska, 1985). Incorporating the decisional balance construct in the model tests the ability of the TTM to integrate core constructs from an alternative model known as the conflict model (Jannis & Mann, 1977). The assumption behind this model is that sound decision-making involves careful scanning of all relevant considerations of potential gains and losses. Velicer, Diclemente, & Prochaska (1985) concluded that decisional balance could be used, along with stages of change, to study the pattern of cognitive and motivational

shifts across the stages of change for most health behaviors. Allying the decisional balance construct with stages of change to study how levels of motivation vary across the stages in interpretation of health-related issues is considered to be important (Herrick, Stone, & Mettler, 1997).

Several studies illustrate that the balance between the pros and cons varies depending upon the stage of change (Prochaska et al., 1994; Reed, Velicer, Prochaska, Rossi, & Marcus, 1997). For the precontemplation stage, the cons outweigh the pros; at the action stage, the pros outweigh the cons. Depending on the behavior in question, the crossover point has been reported to occur in contemplation, preparation, action, or maintenance (Fava, Velicer, & Prochaska, 1994). The crossover indicates a decrease in the cons of the behavior and a simultaneous increase in the pros.

Self-efficacy refers to the situation-specific confidence people have that they can cope with challenging or high-risk situations without relapsing to previous high-risk habits (Bandura, 1977, 1991, 1992). Bandura (1977) introduced the concept of self-efficacy in behavior modification. Since then, it has become a key variable in clinical, educational, social, developmental, health, and personality psychology (Schwarzer & Fuchs, 1997). The major assumption is that all behavior change is facilitated by a personal sense of control. Self-efficacy pertains to personal action control or agency (Bandura, 1992; Maddux, 1991). The "can do" assertion mirrors a sense of control over one's environment and a belief in one's ability to master challenging demands (Schwarzer & Fuchs, 1997, p. 163).

In making judgments about health-related goals, people usually unite perceived control over a situation with means to carry out the actions. Perceived self-efficacy implicitly includes some degree of outcome expectancies because individuals believe they can produce the

responses necessary for desired outcomes. Self-efficacy influences behavior in two ways: through intentions and directly. Behavior may not be under volitional control (Schwarzer & Fuchs, 1997). If an action cannot be performed owing to a lack of resources or opportunities, then the best intentions are worthless.

Researchers have shown that self-efficacy is low in the pre-contemplation and contemplation stages, and is higher in the action stage for a variety of behaviors (Prochaska et al., 1994a; Brug, Lechner, & De Vries, 1995; Galavotti, Cabral, Lansky, Grimley, Riley, & Prochaska, 1995; Weinstein, Rothman, & Sutton, 1998). As people proceed from considering precautions in a general way towards shaping a behavioral intention, contemplating detailed action plans, and actually performing a health behavior on a regular basis, they begin to crystallize beliefs in their capabilities to initiate change.

The primary hypothesis of this study was that the relationships among the stages of consumption, decisional balance, and self-efficacy for fruits, vegetables, and grain products would follow the general patterns found across all behaviors in TTM. The results of this study provide more theoretical insights into young adult's readiness to increase consumption of these foods.

Research Design and Methodology

Young adults aged 18 to 24 years were randomly selected from a mailing list (American Business Consumer Lists, Inc., 1998). A self-administered questionnaire that included 5 items to measure stage of consumption, 20 items on decisional balance, and 20 items on self-efficacy, related to fruits, vegetables, and grain products, and general information was mailed. One hundred and sixteen usable questionnaires were returned out of a possible 800, for a 14.5% response rate. Principal axis factor analysis with varimax rotation was conducted for all the self-efficacy and decisional balance items. Those items with factor loadings of 0.40 or higher

for decisional balance, and 0.50 and higher for self-efficacy, were retained. The self-efficacy items had much higher factor loadings and, therefore, a higher cut-off point was set. The final sub-scales included 11 items on self-efficacy for grain products, 12 items on self-efficacy for fruits, and 13 items on self-efficacy for vegetables. The decisional balance scale included six con items and five pro items for vegetables, five pros and five cons for fruits, and five pros and four cons for grain products. The value of Cronbach's alpha for the scales ranged from 0.47 to 0.65 for pro scales, 0.70 to 0.80 for con scales, and 0.80 to 0.99 for self-efficacy scales. Factor-based scores for pros, cons, and self-efficacy were saved using the regression option and used for further analysis. Decisional balance scores were computed as the difference between the pro and con scores.

Three multivariate analyses of variance (MANOVA) were performed with stages of consumption as the grouping variable and the pros, cons, and self-efficacy scores for stages of consumption as dependent variables. Following a significant MANOVA, a follow-up Univariate analysis of variance (ANOVA), isolating each of the dependent variables, was conducted to determine specific differences on the individual measures across the stages of consumption. Bonferonni post hoc tests were performed to determine significant mean differences among the stages of consumption for each food. All hypothesis tests were performed at the $\alpha = 0.05$ level.

Results

Allocation of stages. Using a constructed index, the respondents sorted into five stages of consumption for fruits, vegetables, and grain products as follows:

1. Precontemplation: Consumption is lower than the recommended number of servings, with no intention to increase consumption in six months.

2. Contemplation: Consumption is lower than the recommended number of servings, with no intention to increase consumption in thirty days.

3. Preparation: Consumption is lower than the recommended number of servings, with an intention to increase consumption in thirty days.

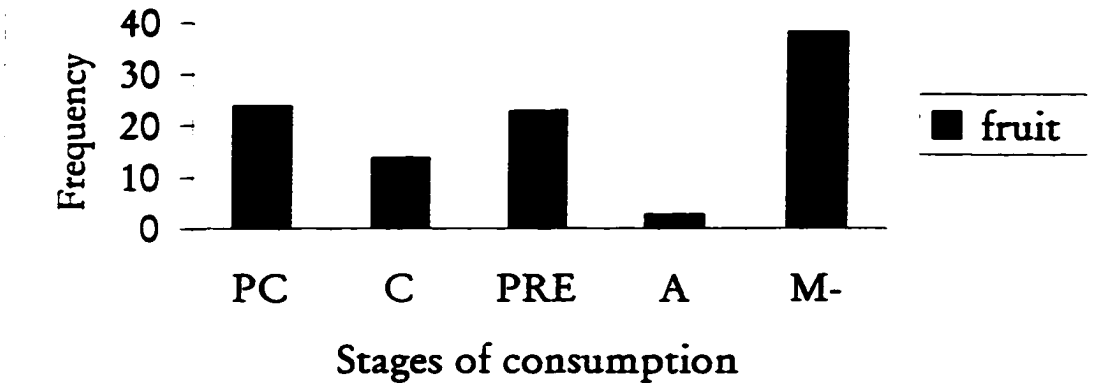
4. Action: Consumption is higher than the recommended number of servings; has consumed at this level for less than six months.

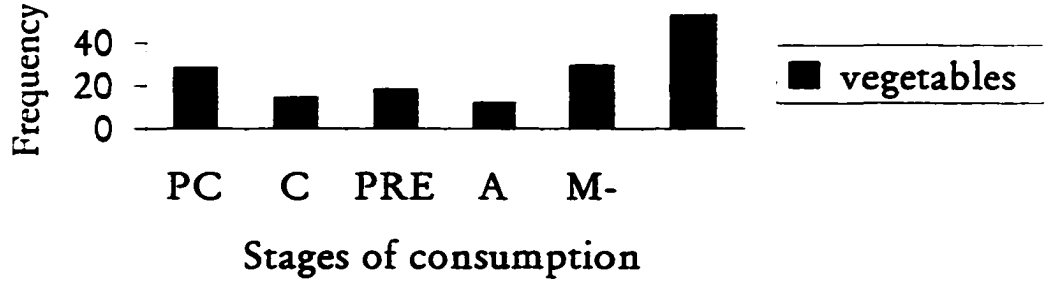
5. Maintenance: Consumption is equal to or higher than the recommended number of servings; has been consuming at this level for more than six months.

The distribution of the respondents into stages of consumption is displayed in Figure 5. The distribution for stage of fruit consumption was 23.6% precontemplation, 13.5% contemplation, 22.6% preparation, 2.5% action, and 37.8% maintenance. The distribution into stages of vegetable consumption was 27.9% precontemplation, 14.0% contemplation, 17.6% preparation, 11.6% action, and 28.9% maintenance. The stages of grain products consumption were distributed as 47.8% precontemplation, 5.3% contemplation, 13.9% preparation, 10.4% action, and 22.6% maintenance.

The overall MANOVA indicated that the dependent variables of cons, pros, and self-efficacy differed significantly over the five stages of fruit, vegetable, and grain products consumption. Table 6 presents the analysis of variance on each of the dependent variables for fruits, vegetables, and grain products. The overall models for grain products, vegetables, and fruits are significant.

In the MANOVA (Wilk's lambda = 0.736, $p<0.002$, observed power is 0.978), for the stage of grain consumption, only self-efficacy is significantly associated with the stages of grain consumption. The model explains 8.5% of the variance in pro scores, 5% in con scores, and





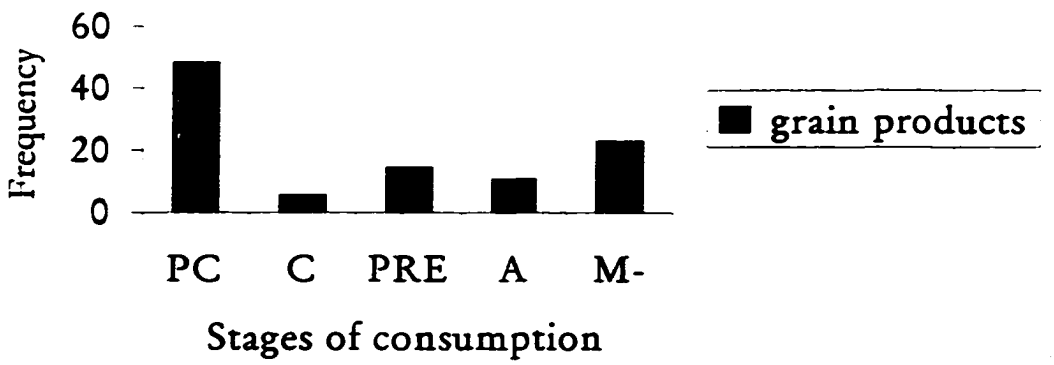


Figure 5. Stages of fruit, vegetable, and grain product consumption

Table 6. Stages of consumption as predictors of pros, cons, and self-efficacy

	Dependent variable	F	Sig.	Eta squared
Fruits	Pros	3.2	0.16	.125
	Cons	3.2	.017	.114
	Self-efficacy	4.9	.001	.165
Vegetables	Pros	3.1	.020	.108
	Cons	2.6	.038	.095
	Self-efficacy	7.6	.000	.230
Grain products	Pros	2.4	.057	.085
	Cons	0.14	.967	.005
	Self-efficacy	6.3	.000	.197

19.7% of the variance in self-efficacy scores. Contrast results show differences in pro scores for grain products in action and preparation stages of consumption ($p<0.044$).

There were no significant differences in con scores among the stages of consumption. Self-efficacy scores were significantly different between precontemplation and maintenance stages ($p<0.001$), and between precontemplation and preparation stages ($p<0.001$).

The stages of fruit consumption were significantly associated with the dependent variables of decisional balance and self-efficacy (Wilks' lambda 0.710, $p<0.000$, and observed power = 0.976). The con scores for increasing fruit consumption ($F=3.202$, $p<0.016$, and observed power < 0. 810), pro scores (3.184, $p<0.017$, observed power = 0.808), and self-efficacy ($F=4.879$, $p<0.001$, and observed power = 0.950) were significantly associated with the

stage of fruit consumption. The stages of fruit consumption explained 11.5% of the variance in con, 11.4% in pro, and 16.5% in self-efficacy scores.

MANOVA contrasts showed that the con scores for increasing fruit consumption are significantly different at precontemplation and maintenance ($p<0.002$), contemplation and maintenance ($p<0.016$), and preparation and maintenance ($p<0.046$), but not for action and maintenance ($p=0.598$) stages. The pro scores showed significant differences among precontemplation and maintenance ($p<0.020$), preparation and maintenance ($p<0.007$), and action and maintenance ($p<0.045$), but not maintenance and contemplation ($p<0.747$) stages. Self-efficacy for fruit consumption were significantly different between precontemplation and maintenance ($p<0.000$), contemplation and maintenance ($p<0.014$), and preparation and maintenance ($p<0.009$), but not action and maintenance ($p < 0.654$) stages. The stage of vegetable consumption explained 10.8% of the variance in pro, 9.5% in con, and 23% in self-efficacy scores. The stage of vegetable consumption was significantly associated with the con scores ($F=2.6$, $p<0.038$, power = 0.719), pros ($F=3.1$, $p<0.020$, power = 0.790), and self-efficacy ($F=7.6$, $p<0.000$, power = .996). The overall model explains 20% of the variance (Wilk's lambda = 0.594, $p<0.000$).

Results on the contrast showed significant differences are apparent in pro scores between the precontemplation and contemplation stages and maintenance and action stages ($p<0.020$) and maintenance ($p < 0.002$) stages. There were significant differences in con scores at precontemplation and maintenance ($p<0.037$), contemplation and maintenance ($p<0.051$), preparation and maintenance ($p< 0.006$), and action and maintenance ($p< .016$) stages. The contemplation stage differed with preparation and maintenance stages, and preparation differed from maintenance. The action stage differed significantly only with precontemplation. With

regard to pro scores for vegetable consumption, the stages of preparation and maintenance did not differ significantly. Differences in self-efficacy scores were found for precontemplation and maintenance ($p< 0.000$), contemplation and maintenance ($p<0.019$), and preparation and maintenance ($p<0.022$) stages. No significant differences in self-efficacy scores were found between action and maintenance stages ($p<0.267$), whereas, precontemplation and maintenance stages differed significantly from all other stages of vegetable consumption.

Relationships between con, pro and self-efficacy scores, and stages of consumption

Figure 6 displays the results of the relationship between the pros and cons at the stages of consumption. Generally, the pro scores of increasing consumption of the three food groups increased from precontemplation to the maintenance stage. For fruit consumption, the pro scores increased from precontemplation to maintenance stages with a decrease between contemplation and action stages. The pro scores of increasing vegetable consumption increased from precontemplation to maintenance with a slight decrease in action stage.

For grain consumption, the pro scores increased consistently from contemplation to maintenance with a sharp decrease at the action stage. Contrary to hypothesized relationships in the TTM model, the pro scores decreased at the action stages for the three food groups—the pro scores are expected to increase at action stage. In contrast, the cons for increasing grain products consumption increased at the action stage.

Decisional balance. Decisional balance is computed as the difference between the pro and con scores. Decisional balance is positive at the contemplation and maintenance stages of fruit consumption. There are two crossover points: between precontemplation and contemplation, and between action and maintenance stages of fruit consumption. Figure 7

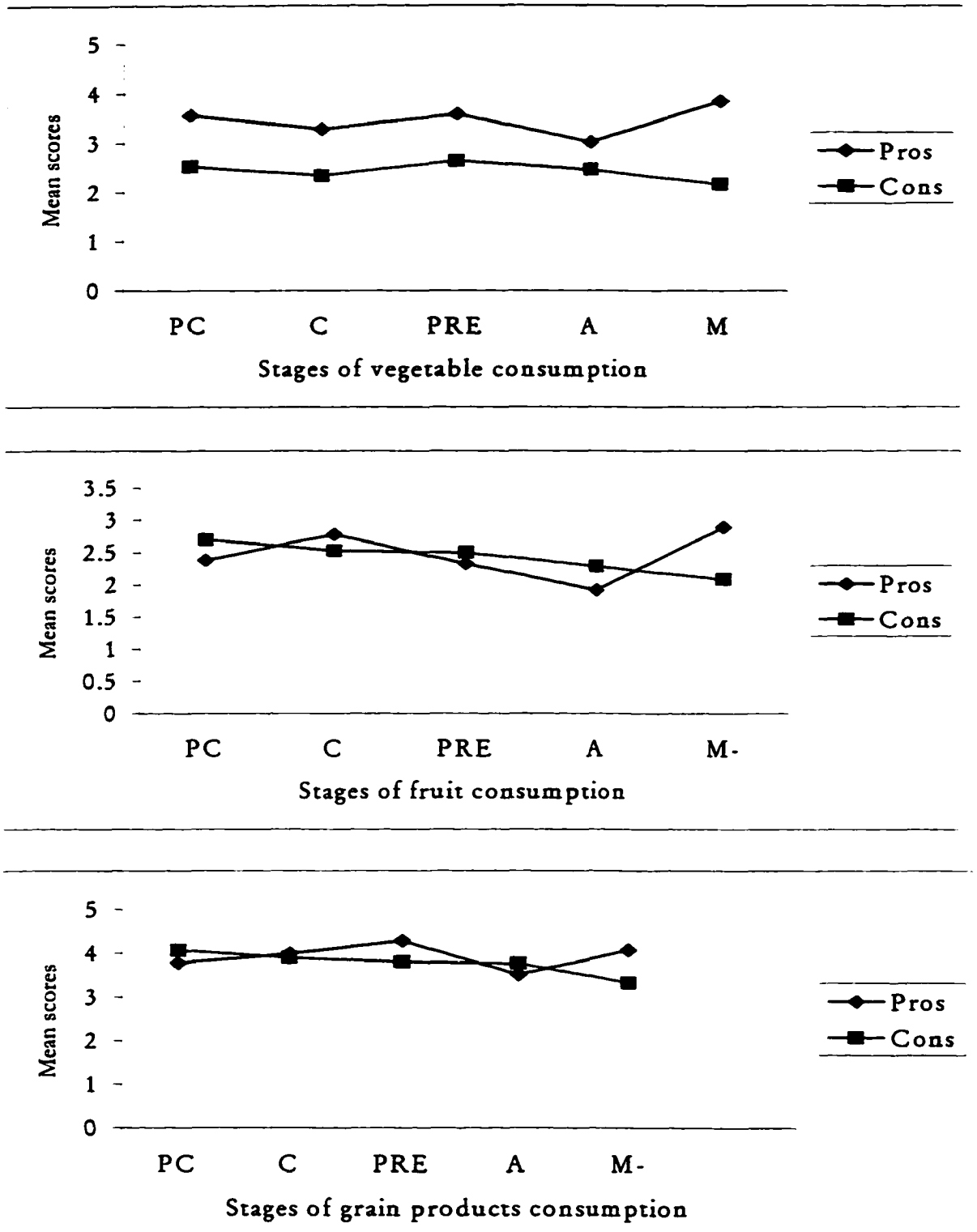


Figure 6. Pros and cons across the stages of consumption

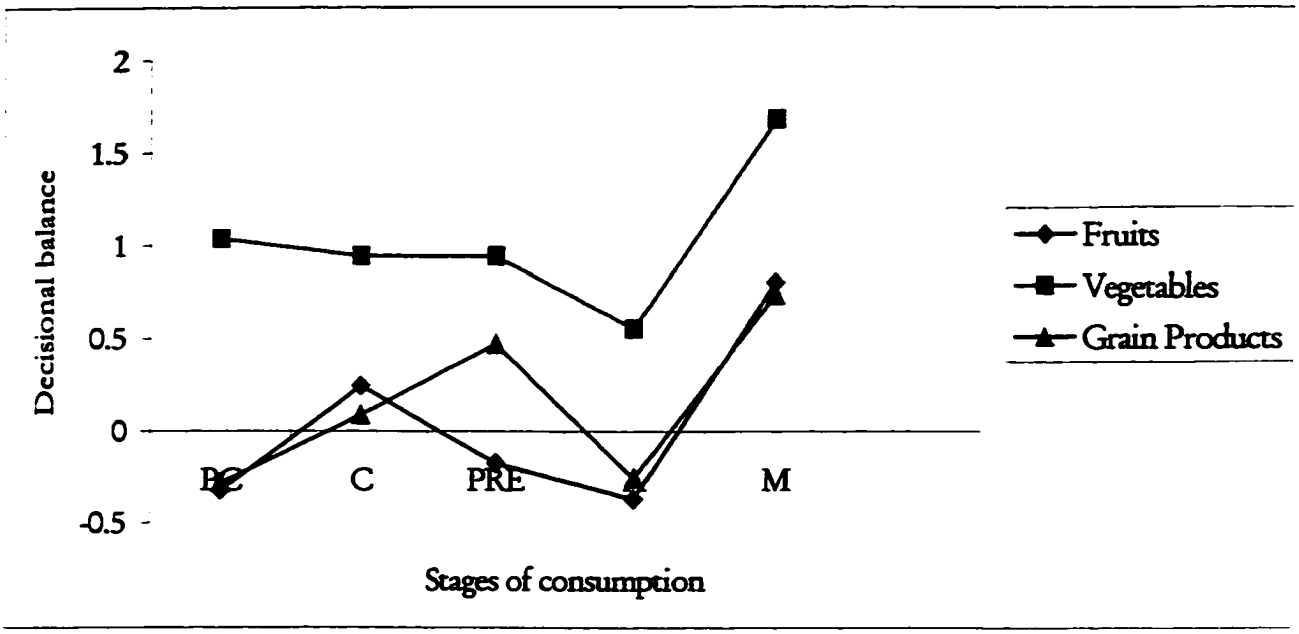


Figure 7. Decisional balance across the stages of fruits, vegetables, and grain products consumption

shows how decisional balance varies with stages of consumption. The pros for increasing vegetable consumption are higher than the cons for all the stages of consumption making for a positive decisional balance for vegetables in all the stages. For grain product consumption, the preparation stage and maintenance stages have positive decisional balance.

Self-efficacy and stages of consumption

As expected, the self-efficacy scores for consuming the recommended amount of the servings from for the three food groups increased from precontemplation to the maintenance stage. However, there was a decrease in self-efficacy for grain consumption between the preparation and action stages. Among the three food groups, self-efficacy scores for grain consumption were higher than for fruit scores, which in turn were higher than scores for vegetable consumption. At the action stage, the self-efficacy scores for fruits were higher than

grain products and vegetables. At the maintenance stage, self-efficacy scores were about the same for fruits, vegetables, and grain products. Figure 8 shows the pattern of self-efficacy scores across the stages of consumption. Self-efficacy increased in a linear fashion for stages of vegetable consumption. There is a sharp increase in self-efficacy scores for fruit consumption from preparation to action stage. There was sharp drop in self-efficacy scores from the preparation to action stage for grain products.

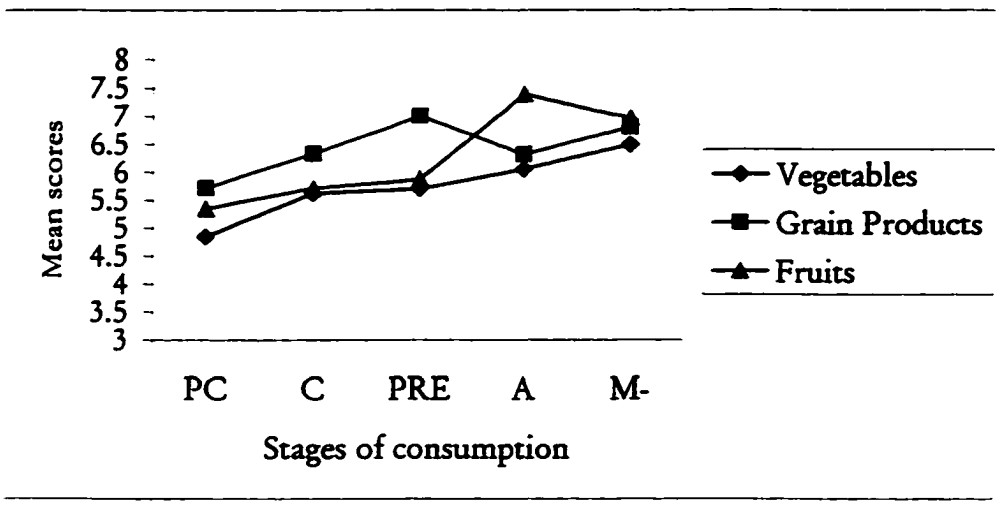


Figure 8. Self-efficacy across the stages of fruits, vegetables, and grain products consumption

Summary and Discussion

This study presents a preliminary attempt to examine consumption of fruits, vegetables, and grain products using three constructs in TTM. The primary objective was to investigate differences in decisional balance and self-efficacy scores among the five stages of consumption for fruits, vegetables, and grain products. It was expected that self-efficacy and decisional balance related to food consumption would follow a similar pattern for each of the foods as other health behaviors assessed with TTM (Galavotti et al., 1995; Prochaska & Velicer, 1997b;

Weinstein et al., 1998). Based on their current consumption and intention to increase consumption of fruits, vegetables, and grain products, individuals were sorted into their respective stages of consumption..

Results from multivariate analysis of the relationships among the TTM constructs indicate that pro, con, decisional balance, and self-efficacy scores differed with stages consumption. Generally, the pros of increasing consumption of the food groups increased from precontemplation to maintenance stages with the exception of the action stage. At the action stage, pro scores tended to decrease for the three food groups. However, there was no corresponding increase in con scores at the action stage except for grain products consumption. There was no significant difference among the pros scores for vegetables and fruits among stages of consumption. These inconsistencies may be due to the different ways advantages and disadvantages of increasing consumption as measured in the study; toward changing a behavior to a criterion consumption with which the respondents have no experience and therefore certain aspects of the behavior may not have been tapped (Brug et al., 1995).

Generally, the con scores decreased consistently from precontemplation to maintenance stages for the three food groups. Significant differences across the derived con scores for young adults were detected in precontemplation, contemplation, preparation, action, and maintenance stages. The high con scores at the action stage implies that the perceived barriers to consuming these foods are still present even when individuals are already meeting the recommended intake.

Relative to the decisional balance for vegetables, the pro scores of increasing consumption were higher than the con scores for all stages of consumption. This is contrary to findings related to other health behaviors (Prochaska et al., 1994)-the pro scores were lower than the con scores at the precontemplation and contemplation stages with an obvious crossover

point between the preparation and action stages. As expected, the pro scores were consistently higher in the contemplation stage than precontemplation for the three food groups. For fruits, the pro scores were higher than con scores at the contemplation and maintenance stages.

Having a positive decisional balance did not necessarily place individuals in action or maintenance stages. Those in precontemplation, contemplation, and preparation stages of vegetable consumption, and the contemplation stage of fruit consumption had positive decisional balance. For grain products, the preparation, and maintenance stages had higher pro scores than con scores, indicating a positive decisional balance.

Surprisingly, those in action stages for fruits and grain products had a negative decisional balance. This pattern, however, is not unique to food consumption or necessarily a result of a measurement error. Prochaska et al. (1994) reported this phenomenon: for 5 of the 12 behaviors studied, the pro scores were higher than con scores in the action stage, lower than con scores in four of the behaviors, and equal to con scores in two of the behaviors. Unlike risky behaviors, where a termination stage was expected, and where pro scores must increase significantly to change a behavior, the presence of pro scores did not have a corresponding absence of con score at action and maintenance stages..

The crossover point for pros and cons was between action and maintenance, for the three food groups taking into account that the pro scores decreased during action stages. These findings are consistent with previous research wherein the crossover of the pro scores and con scores appeared were at the contemplation and action stages for most health behaviors (Fava Velicer, & Prochaska, 1994; Prochaska et al., 1994). For delinquent behaviors, mammography screening, and exercise acquisition, the crossover point was evident during the action. Self-

efficacy scores consistently increased from precontemplation to maintenance with a slight decrease at the action stage of grain consumption.

For the three food groups, the action stage did not support the hypothesized relationship with regard to decisional balance. It is possible that the deviation from TTM is the stages of contemplation and preparation, and action and maintenance are distinguished by a time factor and not qualitatively. Any shift in time distinguishing the stages could alter relative placement. A tendency to exaggerate interest in action could weaken relationships among the construct and those who appear to be in one stage may belong elsewhere. Further investigations of the action stage are needed.

Though the stages of consumption should be mutually exclusive, there is no complete discontinuity from one stage with the other stages. Young adults in different stages did not always differ significantly in pro and con scores. This deviation from the expected pattern for con scores and pro scores at the action stage also could be related to the fact that most people eat out of habit. Behaviors performed repeatedly over time become habitual. The observed level of consumption, then, may not correspond to cognitive changes in decisional balance or self-efficacy. With regard to the health factor in food selection, the ideal of healthfulness as a learned concept and norm is not always internalized and translated into practice (Achterberg & Clark, 1992). In such cases, one becomes less aware of reasons for performing a behavior. As a result, desired behavior change may be less associated with self-efficacy and perceived advantages of changing (Brug et al., 1995).

A less significant decrease in con scores across the stages is said to be more characteristic of adoption, rather than cessation, in which continual effort is required to maintain behavior (Galavotti et al., 1995). The advantages of changing a behavior may be associated more strongly

with cessation of risky behaviors and less strongly predictive with behaviors such as adoption of dietary habits. In such cases, many of the benefits are delayed and intangible (Rakowski et al., 1997). Consequently, these perceived advantages of changing may not have an impact if the foods are too expensive, not accessible, and one is too busy to bother. People may be aware of the benefits of these foods but the potential for lower consumption may remain, unless the barriers are decreased.

The young adults were meeting the recommended level of consumption for some but not all of the three food groups simultaneously. Typically, to promote health behaviors, awareness is raised of benefits to be derived from adopting the behavior. However, the relationship between perceived benefits of increasing consumption of the foods and actions is not straightforward from the data. This circumstance may pose a significant challenge to intervention efforts and needs further investigation. This study shows that in most stages, the decisional balance for increasing consumption is positive even in those stages of precontemplation and preparation that do not correspond to meeting the recommended intake. This implies that, if a variable has reached its limit whereby individuals are aware of benefits to be reaped by increasing consumption of the food group, and people have not acted, there is a need to shift to another variable. In such an instance, the focus should be on decreasing the perceived barriers and increasing the self-efficacy. Also, food specific advantages and disadvantages should be addressed separately and simultaneously. Therefore, further testing of these constructs, and the inclusion of other viable constructs would increase the accuracy of the TTM for measuring food consumption, and designing and measuring outcomes of nutrition education programs.

CHAPTER 5. DEMOGRAPHIC PREDICTORS OF DECISIONAL BALANCE AND SELF-EFFICACY FOR CONSUMPTION OF FRUITS, VEGETABLES, AND GRAIN PRODUCTS AMONG YOUNG ADULTS

A paper to be submitted to the Journal of Health Psychology

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Abstract

A better understanding of cognitive, situational, and demographic factors associated with readiness to increase consumption of fruits, vegetables, and grain products among young adults can improve the design and evaluation of nutrition education programs. This study presents findings on the relationships of demographic factors with decisional balance and self-efficacy for increasing consumption of fruits, vegetables, and grain products. Eight hundred young adults, 18 to 24 years old, were randomly selected and 116 usable questionnaires (14.5%) for a return rate of 14.8% were analyzed. The psychosocial factors measured were cons (α=0.78, 0.79, 0.70 for fruits, vegetables and grain products) con (α=0.63, 0.47, 0.57 for fruits, vegetables and grain products), and self-efficacy (α=0.94, 0.88, 0.89 for fruits, vegetables and grain products). Females, single persons, and younger respondents are more likely to increase fruit consumption. Young adults in precontemplation and contemplation stages of consumption, residents of sororities/fraternities, and African Americans had lower self-efficacy scores for vegetables than the rest. Males have lower pro scores than females and unmarried respondents had higher pro scores for grain products. Living in a residence hall is a positive predictor and a possible enabler for increasing consumption of the fruits, vegetables, and fruit products. Living in fraternities/sororities seems to have adverse effects that increased the disadvantages and

decreased the advantages and self-efficacy scores for increasing consumption of either fruits and vegetables, or grain products.

Keywords: young adults, demographic factors, decisional balance, self-efficacy, stage of consumption.

Introduction

Young people have been identified as a group who are likely to develop at-risk-health behaviors that may become permanent (DHHS & USDA, 89-1255, 1990). However, there is agreement that major health problems could be controlled by modifying an individual's behavior and dietary habits, particularly through 15 to 24 years of age (Beerman, 1990). Research about the target audience's need for nutrition education and appropriate delivery methods ranks high as a major challenge for nutrition educators. For these reasons, this study has focused on young adults as a target audience, and the socio-economic backgrounds and situational factors that foster individual differences.

Young adults, defined as those between the ages of 18 to 24 are at a critical stage of development. They are making the transition from parental control of their food intake to being responsible for their own and possibly their children's intake as well (Lau, Quardel, & Hartman, 1990; Mitchel, Herzler, & Webb, 1994). Also, food habits formed by young adults at this stage could be a foundation for future practices that will affect their health throughout life. Studies have shown that young adults, 18 to 24 year old, consume exceptionally small amounts of fruits, vegetables, and grain products (Georgiou, et al., 1997; Keim et al., 1997). Further, the fruits, vegetables, and grain products consumed are limited in variety and to a few food items from each food group (Georgiou, et al., 1997; Huang, Song, Schemmel, & Hoerr, 1994; Keim et al., 1997).

A variety of demographic factors and situations influence eating patterns of young adults. Poor eating patterns for young adults have been attributed largely to busy schedules, lack of self-discipline, skipping meals, unbalanced meals, too much snacking, and a preference for junk foods (Story & Resnick, 1986). Others have reported that taste was a strong predictor in the frequency of consumption (Lewis, Sims, & Shannon, 1989). Conflicting advice on dietary recommendations has been found to be a barrier by those reporting difficulty consuming a healthful diet (Cotugna, Suba, Heimendinger, & Kahle, 1992; Harnack et al., 1998; Morreale & Schwartz, 1995). There also is the belief that healthy foods cost more. Other researchers also reported that those aged 18-24 years were less likely to have negative attitudes toward taste. Other reports have indicated that taste may not be a barrier to eating a healthy diet. Krebs-Smith et al. (1995) reported that most people like fruits and vegetables. Indeed, it is the reluctance to give up foods currently enjoyed that is a primary explanation for not changing diets.

In terms of inter-group differences, men are more likely to respond negatively with respect to taste, ease of eating a healthy diet, and conflicting dietary advice. Women are more likely to report lack of support from family and friends. Blacks and Hispanics are more likely to have negative attitudes about food taste, cost, and dietary advice compared to whites (Harnack, et al., 1998). Evidently, dietary behavior of college students does not accurately describe the nutritional practices of young adults as a group. College students and college graduates followed practices clearly different from those of non-students with respect to diet (Georgiou, et al, 1997). The study also identified women as prone to risks associated with inadequate intake of vegetable and dairy foods. Obvious differences also exist between rural and urban residents (Amos & Brun, 1993).

For young adults in college, convenience was a major reason given by those who ate at food establishments (Hertzler & Fray, 1992). Some were unable to prepare foods, while others wanted to try something new, a chance to get out, and or to socialize. The place of residence is reported to affect food choices. Off-campus students were less likely to consume fruits and vegetables daily (Beerman, 1990). College men chose foods with higher levels of nutrients in all categories (Lieux & Manning, 1992).

Because of an increased recognition that food choices and good diets can help reduce risk factors for chronic diseases-such as obesity, high blood pressure, and high blood cholesterol (Harris, 1996). Factors such as emotional attachment, habit, resources, and convenience are important considerations in the assessment of food behaviors among young adults (Georgiou et al., 1997; Keim et al., 1997). To determine the decision-making process of selected populations accurately, factors that predispose, reinforce, and or enable dietary behavior must be thoroughly investigated.

The knowledge base about young adults is insufficient in several aspects. First, much of the research is atheoretical and has provided a mere description of factors and attitudes related to food consumption. Secondly, much of the research has focused on demographic variables. Dietary behavior change is complex and there is need to understand how people change before effective interventions (Kristal, Patterson, Glanz, Heimendinger, Hebert, Feng, & Probart, 1995).

Prochaska et al. (1994) explained that demographic indicators have limited utility because they do not identify causal processes that increase or reinforce food habits in certain groups or with individuals. In addition, demographic variables cannot be used to develop a means of prevention and are not amenable to intervention (Prochaska et al., 1994). Theories of behavioral

change can be used to identify underlying causal variables that would best explain how variables are related to food consumption and related behaviors. Such models would explain why people do not modify their food consumption patterns despite adequate exposure to a variety of affordable foodstuffs and adequate information. This study examines the relationships of situational factors with the cognitive constructs of self-efficacy and decisional balance.

Decisional balance refers to the perceived relative weighing of the advantages (pros) and disadvantages (cons) of increasing consumption of more grain products, vegetables, and fruits. Self-efficacy refers to young adults' situation-specific confidence that they can increase consumption to consume the recommended amounts of grain products, vegetables, and fruits per day irrespective of their situations (Bandura, 1977).

Even though health concerns related to food consumption were noted among young adults (Crockett, Mullis, & Perry, 1988), cost of food and conflicting dietary advice distinguish 18 to 24 year olds from others (Harnack et. al., 1998). A related concern is that a majority of young adults are guided in their food selection by considerations unrelated to health such as taste, cost, and convenience. Awareness of the dangers of a poor diet is not acquired until the mid-twenties and by then, patterns such as eating behaviors are set (Kayman, 1989). By targeting this age group, it is believed the dietary health of future generations of Americans will be improved. Because people control their own nutrition and food-related behaviors, efforts to support individual behavior change should come before success can be achieved in broad nutrition education efforts (USDA, 1995).

Food consumption and food choices occur in a context that is broader than the eating of a food-including planning, shopping, available income, time, food preparation skills, food storage space, and marital status. These situational factors, although not features of food

consumption, are associated with many food choices. This study examined determinants of the predisposing and enabling factors of decisional balance and self-efficacy for increasing consumption of fruits, vegetables, and grain products among young adults. Demographic variables were examined for significant associations with decisional balance, self-efficacy, and stages of fruit, vegetable, and grain products consumption.

Research Design and Methodology

Young adults were randomly sampled from a current consumer mailing list (American Consumer Lists, Inc., 1998). An instrument to measure self-efficacy, decisional balance, stages of consumption, and demographic characteristics of young adults was administered (Appendix B). One hundred and nineteen questionnaires were returned from a possible 800, for a 14.9 % return rate. One hundred and sixteen (14.5%) questionnaires were usable. Stages of consumption were determined using a constructed index. Factor analysis with equamax rotation was performed for the decisional balance and self-efficacy scales and factor-based scores for pro, con, and self-efficacy items were computed.

To evaluate the relationships among pros, cons, self-efficacy, and stage of consumption, and general characteristics of the young adults, multiple regression was used. The independent categorical variables of stage of consumption, age, living arrangement, gender, relationship status, college status, residence, race, and Hispanic origin were used as grouping factors. Self-efficacy and decisional balance scores were the dependent variables. The continuous variables of income, amount spent on food per month, and age were entered as covariates. The hierarchical model entered the independent variable series in steps and allowed assessment of the significance of R for each variable. In the final step of the regression analysis, the stage of consumption and demographic variables scores were related to the outcome variables of self-

efficacy, and the pro and the con scores of increasing consumption of fruit, vegetable, and grain products. Estimated marginal means for each dependent variable were calculated.

Results

Table 7 displays information on the characteristics of the respondents. Of the 116 total respondents, 32.1% were male and 67.9% percent were female. The age of the respondents ranged between 18 and 24 years. The majority (62%) were full-time students, with 7.4% part-time and 20.4% non-students. Exactly 10.2% percent had graduated from college. Approximately 35 % lived in places they rented with others, 27% lived at home with parents, 26.1% lived in residence halls, and only a small percentage lived alone (8.1%) or in sorority/fraternity (3.6%). The majority (78.4%) reported they had never married, and 16.2% currently were either married or living as married. Exactly 48.7% resided in cities, 21.8% in suburbs, and 29.5% in rural areas. Reflecting the local area, 91.1% were white/Caucasian, 1.8% African American, 0.9% Native American, and 6.3 % racially mixed. About 24.1% of the sample reported they were of Hispanic origin.

The majority (62.2%) earned an income of less than $10,000. Exactly 17.1% earned $10,000 to 14,999, 6.3% earned $15,00 to 19,999, 8.1% earned $20,000 to 24,999, 2.7% earned $25,000 to 29,999 and 3.6% earned $30,000 to 34,999. The amount of money spent on food per month ranged from less than $50 dollars (19.8%), $50 to 100, (31.5%), $100 to 200 (40.5%), $200-300 (2.7%) to greater than $300 (5.4%). The young adults were allocated into stages of consumption as follows: the distribution for stage of fruit consumption was 23.6% precontemplation, 13.5% contemplation, 22.6% preparation, 2.5% action, and 37.8% maintenance. For vegetable consumption, the distribution was 27.9% precontemplation, 14.0% contemplators, 17.6% preparation, 11.6% action, and 28.9% maintenance. Stages of grain

Table 7. Demographic characteristics of respondents [a]

		%
Gender	Male	32.1
	Female	67.9
Age	18	2.7
	19	16.4
	20	14.5
	21	12.7
	22	20.9
	23	13.6
	24	19.1
College status	Full-time	62.0
	Part-time	7.4
	Non-student	20.4
	Graduated from college	10.2
Living Arrangement	Rent with others	35.1
	At home with parents	27.0
	Residence halls	26.1
	Living alone	8.1
	Sorority/fraternity	3.6
Relationship status	Never married	78.4
	Married or living as married	16.2
	Married with children	2.7
	Separated	0.9
	Divorced	1.8
Race	African American	1.8
	Native American	0.9
	White/Caucasian	91.1
	Other combination	6.3

[a] N=116

Table 7. (continued)

Hispanic	Yes	24.1
	No	75.9
Income	<10,000	62.2
	10,000-14,999	17.1
	15,000-19,999	6.3
	20,000-24,999	8.1
	25,000-29,999	2.7
	30,000-34,999	3.6
Amount spent on food	<$50	19.8
	$50-100	31.5
	$100-200	40.5
	$200-300	2.7
	>$300	5.4

products consumption were distributed as 47.8% precontemplation, 5.3% contemplation, 13.9% preparation, 10.4% action, and 22.6% maintenance.

Grain products consumption

The best predictors of pro scores for increasing grain products consumption were stage of consumption (β=0.46 $p<0.001$), gender (β=0.33, $p< 0.000$), relationship status (β=-0.35, $p<0.005$), and race (β=0.23, $P>t= 0.011$). Table 8 presents the results on grain products. The three variables explained 27% of the variance in pro scores for increasing consumption of grain products. Females had higher mean pro scores (mean=2.16) for increasing grain consumption than males (mean=1.14). Caucasians had the lowest pro scores for grain products (mean=5.88), than the racially mixed (mean=5.87), or Native Americans (mean=6.64). African Americans had

Table 8. Predictors of decisional balance and self-efficacy for grain products consumption

Dependent Variables	Predictors	Beta (β)	F	t	sig.	R^2
Self-efficacy	Stage of consumption	-0.41	17.5	4.4	0.000	0.233
	College status	-0.27		-.2.9	0.005	
Pros	Gender	-0.33	17.4	5.06	0.000	0.270
	Stage of consumption	-0.46		3.51	0.001	
	Current relationship status	-0.35		3.38	0.005	
	Race	-0.23		-2.02	0.011	
Cons	Hispanic origin	-0.44	13.25	-5.17	0.013	0.389
	Living arrangement	-0.58		-7.21	0.000	
	Stage of consumption	-0.24		-2.91	0.004	
	Income	-0.27		-3.04	0.003	

the highest pro scores (mean=7.23). Those who were married with children had the highest pro scores (mean=2.13) compared to those not married (mean=2.11), married without children (mean=1.59), and divorced (mean=1.36).

The con scores for grain consumption were predicted significantly by the stage of grain consumption (β=-0.24, $p<0.000$), income (β=-0.27, $p<0.003$), Hispanic origin (β=-0.44, $p<0.013$), and living arrangements (β=-0.58), $p<0.000$). Those living in residence halls (mean=1.29) differed significantly from those in sororities and fraternities (mean=2.65). The

con scores at the precontemplation stage (mean=1.44) were higher than at contemplation (mean=1.500), preparation (mean=1.32), action (mean=1.14), and maintenance (mean=1.43) stages. The variables in the model explained 38.9% of the variance in con scores for increasing grain consumption.

Self-efficacy for meeting the recommended amount for grain products is predicted by stage of grain consumption (β=0.41, $p<0.000$) and college status (β=0.27, $p<0.005$). Self-efficacy scores at precontemplation are less than at contemplation, preparation, and maintenance stages. The action stage had lower self-efficacy scores than the preparation stage. Full-time students had higher self-efficacy scores (mean=6.26) than non-students (mean=6.17), whose scores were higher than those of part-time (mean=5.99), non-students (mean=5.93), and those who had graduated from college (mean=4.02). The two variables explained 23.2% of the variance in self-efficacy scores ($F=17.47$, $p< 0.000$).

Vegetable consumption

The pro scores vegetable consumption were significantly associated with gender (β=0.410, $p<0.000$) and Hispanic status (β=0.190, $p<0.030$). Females (mean=2.65) had higher mean pro scores for increasing vegetable consumption than males (mean=2.07). Hispanics (mean=2.28) had lower pro scores than non-Hispanics (mean=2.66) (Table 9). The overall model explained 17.7% of the variance in the pro scores for vegetables. The con scores vegetables were significantly associated with living arrangement (β=0.31 $P<0.002$), income (β=-0.30, $P<0.03$), and Hispanic status (β=-0.33, $P<0.01$). Those living in sororities and fraternities had the highest con scores for increasing vegetables consumption (mean =2.96) compared to those living alone (mean=1.55), at home with parents (mean=1.46), renting with others (mean =1.51), and in residence halls (mean=1.54).

Table 9. Predictors of decisional balance and self-efficacy for vegetable consumption.

DV	Predictors	beta	F	t	sig.	R^2
Self-efficacy	Stage of consumption	0.48	27.4	5.2	0.000	0.232
Pros	Gender	.041	4.019	4.44	0.00	0.177
	Hispanic origin	0.19		-.2.0	0.048	
Cons	Hispanic origin	-0.33	9.275	-3.6	0.001	0.230
	Living arrangement	0.31		3.2	0.002	
	Income	-0.30		-3.1	0.003	

Hispanics (mean=2.12) had higher con scores than non-Hispanics (mean=1.42). The con scores were highest in the $20,000-24,999 income group (2.98), and the $15,000-19,999 income group (mean=2.74). The lowest con scores were among those earning higher than $25,000 (mean=1.04). The variables in the model explained 23.2% of the variance in con scores for vegetable consumption ($F=5.938$, $p<0.001$).

In the multiple regression model for vegetable consumption, the stage of vegetable consumption ($\beta=0.481$, $p>t=0.000$) was the only variable significantly associated with self-efficacy for consuming the recommended amounts of vegetable. The self-efficacy scores increased from the precontemplation stage to the maintenance stage. None of the other predictor variables was significant in the model. The model explained 23% of the variance in self-efficacy scores for vegetables ($F=27.381$, $p<0.000$).

Fruit consumption

Table 10 presents the results on fruit consumption. The pro scores for increasing consumption were significantly related to gender (β=-0.35, $p<0.00$), age (β=-0.19, $p<0.046$), and relationship status (β=0.31, $p<0.00$). Females had higher pro scores (mean=2.34) than males (mean=2.19). With respect to age, 18- year-olds had the highest pro scores (mean=3.93), whereas 23-year-olds had the lowest pro scores (mean=2.20). The pro scores tended to decrease as age increased. Those who were unmarried showed a significant difference in pro scores from those who were married. The variables in the model explained 25.9% of the variance in the pro scores for fruits.

The con scores at precontemplation (mean=1.968) differed significantly from those of the maintenance stage (mean=1.357). Relationship status was significantly associated with con scores for increasing consumption of fruits.

There was a significant difference in the con scores between those living in sororities (mean=2.36), those living at home (mean=1.98), and those in residence halls (mean 1.28). Significant mean differences were found in con scores between maintenance and precontemplation stages (mean=1.621, $p<0.003$). The variables in the model explained 48.2% of the variance in con scores for fruit consumption. Living arrangements and race were significant predictors of self-efficacy for fruits. Males (mean=5.544) had higher scores than females (mean=5.52). The self-efficacy scores for those living in residence halls and sororities were significantly different (mean difference=2.54, $p<0.006$). Those in residence halls (mean=4.40) had higher scores than those living at home (mean =5.34), living alone (mean=5.5), or those who rent with others (mean=4.49). The model explained 26.7% of the variance in self-efficacy scores for fruit consumption.

Table 10. Predictors of decisional balance and self-efficacy for fruit consumption

Dependent Variables	Predictors	beta	F	t	sig.	R^2
Self-efficacy	Stage of consumption	0.38	10.552	4.164	0.000	0.267
	Living arrangement	-0.27		-2.957	0.004	
	Race	0.21		2.262	0.026	
Pros	Gender	0.35	10.741	-3.785	0.000	0.259
	Current relationship status	0.31		3.384	0.001	
	Age	-0.19		-2.023	0.046	
Cons	Hispanic origin	-0.44	13.245	-5.171	0.000	0.482
	Stage of consumption	-0.18		-2.129	0.036	
	Living arrangement	0.29		3.316	0.001	
	Income	-0.27		-3.042	0.003	

Summary and Discussion

Decisional balance and self-efficacy are significantly associated with various demographic variables for fruits, vegetables, and grain products. The pro scores for increasing fruit consumption are predicted by gender, relationship status, and age. Females, single persons, and younger respondents are more likely to increase consumption. The variables in the regression model explained 27% of the variance in pro scores. The cons of increasing fruit consumption are significantly related to Hispanic origin, stage of consumption, living arrangement, and income. Hispanics, those in the lower stages of consumption, those living in fraternities/sororities and those with an income lower than $19,999 had higher con scores. Self-

efficacy for increasing consumption of fruits was related to stage of fruit consumption, living arrangement, and race. Those young adults in lower stages of consumption, residents of sororities/fraternities, and African Americans had lower self-efficacy scores than the rest. These results on fruit consumption agree with a study on college students that reported college status had no direct relationship with the compliance with fruit intake (Beerman, 1990).

The pro scores for vegetable consumption are significantly associated with gender and relationship status. Females have higher mean pro scores than males. Those who reported not being married have lower pro scores than the rest. Con scores of increasing vegetable consumption are significantly associated with Hispanic, living arrangements, and income. The con scores decreased with increased income. Hispanics had higher con scores than the others. Self-efficacy for increasing vegetable consumption was significantly associated only with stage of vegetable consumption. As expected, those in lower stages of consumption had lower self-efficacy scores. In a related study, college status was associated with compliance with the vegetable food group (Beerman, 1990). However, college status was not associated with either of the dependent variables with regard to vegetable consumption in this study.

The pro scores for grain consumption are significantly associated with gender and relationship status. Males have lower pro scores than females. The unmarried respondents had higher pro scores for grain products. The con scores for grain products were significantly associated with Hispanic status. Hispanics had higher con scores than non-Hispanics. Self-efficacy for grain consumption was associated only with the stage of grain consumption. The self-efficacy scores increased from precontemplation to maintenance. The precontemplation stage had the lowest scores, and maintenance stage had the highest self-efficacy scores. These results validate earlier findings that students living in residence halls in settings where students

had food service provided reported higher rates of compliance with the Food Guide Pyramid (Beerman, 1990). The author also reported that marital status had no effect on compliance with the Food Guide Pyramid.

Clearly, cognitive factors as well as situation factors are predictors of decisional balance as well as the situation-specific confidence to consume adequate amounts of fruits, vegetables, and grain products. Situational factors such as living arrangements and relationship status seem to predict more cognitive factors than do the demographic variables of age, race, income, and gender. These results indicate that interventions should focus on the cognitive factors related to changing behavior and the immediate situations of young adults simultaneously. Living in a residence hall is a positive predictor and a possible enabler for increasing consumption of the fruits, vegetables, and grain products. Living in fraternities/sororities seems to have adverse effects that increased the con and decreased the pro and self-efficacy scores for increasing consumption of either fruits or vegetables, or grain products.

CHAPTER 6. SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

Nutrition educators are continually seeking ways to promote increased consumption of fruits, vegetables, and grain products among the general population. The transtheoretical model (TTM) provides a viable approach for studying readiness for such increased food consumption and for strengthening educational strategies to achieve it among young adults.

The purpose of this study was to apply the transtheoretical model of behavior change to consumption of fruits, vegetables, and grain products among young adults 18 to 24 years old. The objectives were to develop and validate measures of decisional balance, self-efficacy, and stages of consumption for fruits, vegetables, and grain products. The instruments were developed by operationally defining the discrete behaviors represented by the constructs in the TTM. Qualitative interviews were conducted to determine content and language for the construction of items. The stages of consumption were defined as the current levels of consumption of the foods, duration of consumption, and intention or lack of intention to increase consumption. Decisional balance was defined as perceived weighing of the advantages (pros) and disadvantages (cons) of increasing consumption of the foods. Self-efficacy assessed the situation-specific confidence that one can consume the recommended amounts of the foods in any given situation.

Eight hundred surveys were mailed to a randomly selected sample of young adults, 18 to 24 years old. One hundred and nineteen questionnaires were returned for a response rate of 14.8%. The data collected were then used to examine the relationships among the constructs in the transtheoretical model with regard to consumption of fruits, vegetables, and grain products. Included was how selected demographic variables predict the perceived advantages and

disadvantages of increasing consumption (decisional balance) and how self-efficacy impacts the confidence that the young adults could consume the recommended amounts of the foods in most situations.

Factor and reliability analyses were conducted to assess the psychometric properties of the instrument. Three multivariate analyses of variance were performed to examine the relationships among decisional balance, self-efficacy, and stages of consumption. Further the relationships among the dependent variables of decisional balance (pros and cons) and self-efficacy and the demographic variables were examined through regression analysis.

Findings and Conclusions

Stages of consumption

The stage of consumption algorithm was used to sort the respondents into stages of consumption. Different and distinct consumption patterns emerged for each of the three food groups. The modal stage was maintenance for fruit, precontemplation and maintenance for grain products, and precontemplation for vegetables. Decisional balance emerged as two distinct components, the pros and cons of increasing consumption and self efficacy emerged as one general factor The data fit the hypothesized model adequately for the three food groups (AGFI > 0.80). The perceived advantages (pro scores) of increasing consumption were significantly associated with stages of consumption only for fruits. The scales developed in this study exhibited moderate to excellent internal consistency: perceived disadvantages (cons, $\alpha > 0.70$), perceived advantages (pros, $\alpha = 0.47$ to 0.63), and self-efficacy ($\alpha > 0.88$).

Relationships among the stages of consumption, decisional balance, and self-efficacy

The overall multivariate analysis of variance models indicated that the dependent variables of decisional balance (cons and pros) and self-efficacy differed significantly by the five

stages of fruit, vegetable, and grain consumption. Generally, the perceived disadvantages (con scores) decreased consistently from precontemplation to maintenance stage for the three food groups. However, at the action stage, the scores on perceived advantages (pro scores) tended to decrease for the three food groups. In the action stage for fruit and grain consumption, the scores on perceived disadvantages of increasing consumption (con scores) were significantly higher than those of the perceived advantages (pro scores). This inconsistency with the hypothesized transtheoretical model could mean that, either the action stage was not measured accurately or food consumption behavior differs from other health behaviors. Self-efficacy was the strongest correlate of stages of consumption. Self-efficacy increased as one moved from precontemplation to contemplation stages. This agrees with Shannon (1990), who found that self-efficacy was a consistent determinant of eating behavior and changes in behavior over time. Overall, the data from this study supports the hypothesized transtheoretical model.

Demographic predictors of decisional balance and self-efficacy

A variety of demographic factors and situations were found to influence the eating patterns of young adults. Gender, relationship status, and age significantly predicted perceived advantages of increasing consumption (pro scores) of fruit. Females and married respondents had higher scores for fruit than did males and unmarried respondents respectively had the highest pro scores. Among the 18-to-24 years olds, 23 year olds had the highest mean pro scores. The perceived disadvantages for increased consumption (con scores) of fruit were significantly associated with Hispanic origin, stage of fruit consumption, and living arrangements. Hispanics had higher con scores than non-Hispanic respondents. The con scores decreased from precontemplation to maintenance. Those living in residence halls had significantly higher pro scores than did those who lived at home, rented with others, or lived in

sororities and fraternities. Self-efficacy for consumption of the recommended amount of fruits was significantly associated with living arrangements, stage of consumption, and race. Self-efficacy scores increased from precontemplation to maintenance stages. Those who lived in residence halls and White Caucasians had significantly higher self-efficacy scores than the other respondents.

The perceived advantages (pro scores) for increasing vegetable consumption were predicted by gender and relationship status. Females and married respondents had higher pro scores for increasing vegetable consumption. The perceived disadvantages of increasing consumption (con scores) for vegetables were significantly associated with Hispanic origin, living arrangements, and income. Perceived disadvantages for increased vegetable consumption (con scores) were higher among Hispanics, those living in sororities and fraternities, and those earning less than 10,000 per year. The self-efficacy scores for vegetable consumption were significantly associated with stage of vegetable consumption. The self-efficacy scores increased from precontemplation to maintenance stages.

The perceived advantages of increasing consumption (pro scores) of grain products were significantly associated with gender and relationship status. Females and married respondents had higher pro scores. The perceived disadvantages (con scores) for grain products were significantly associated with Hispanic origin, stage of consumption, and living arrangements. Hispanics, those in precontemplation, contemplation, and action stages, and those living in sororities and fraternities had the higher con scores than other respondents. Self-efficacy scores for grain product consumption was associated with stage of consumption and college status. Self-efficacy increased from precontemplation to maintenance and full time

college students had higher scores than part-time students, non-students, and those who had graduated from college.

Implications for Nutrition Education

When the specific stages of consumption for fruits, vegetables, and grain products as held by young adults ages 18 to 24 have been identified, then information, support, and reinforcement can be better designed to promote behavioral change. However, only sorting and categorizing individuals into stages of consumption is not adequate. One needs to go beyond stage identification to assess relationships among the stages of consumption, perceived barriers to changing behaviors as articulated by individuals, which can be called decisional balance, potential facilitators of change, such as self-efficacy, and selected demographic variables. Using the transtheoretical model to examine readiness to change behavior through better understanding of the relationships among these can provide deeper insights into desired changes in food consumption patterns.

The patterns of stages of consumption illustrate trends in consumption of the three foods and emphasize the difficulty individual face in maintaining an adequate consumption of them simultaneously. It also confirms that young adults vary in their consumption of fruits, vegetables, and grain products. Clearly, increasing the consumption of a variety of the foods is a challenge, which should be addressed.

The interaction of decisional balance and self-efficacy with stages of consumption may come into play in modifying behavioral intentions and actions. The interactions of the three constructs at each stage of consumption provide a basis for deeper understanding and better description of each stage of consumption for designing educational programs and secondarily for forming the basis of monitoring and evaluating behavior change.

In this study, respondents in different stages of consumption did not always differ significantly in their perception of advantages and disadvantages for increasing consumption. For such individuals, the perceived disadvantages may be strongly related to shared situational factors. It appears to be a case of reciprocal determinism (Baranowski, Perry, & Parcel, 1998), a dynamic interaction between the person, the behavior, and the environment in which the behavior is performed. Such complex interrelationships need multiple avenues for behavioral change, including environment, skill, and personal change. Self-efficacy for meeting the Food Guide Pyramid recommendations for fruits, vegetables, and grain products increased as respondents moved from precontemplation to maintenance for each of the three food groups. However, most respondents reported they were not confident that they knew the recommended number of servings for each of the three food groups, could trace or easily remember the number of servings they had consumed, or could eat the foods more often.

Nutrition educators need to understand these situations better and determine what they may need to change to achieve desired levels of consumption. Attention must be drawn to the importance of increased consumption of these foods among young adults. A heightened awareness of the positive health consequences of increased consumption on decreasing the risk for heart diseases, and on increasing needed fiber and vitamins in the diet should be addressed in education programs. Basic information regarding the recommended number of servings and serving sizes should be part of such nutrition education programs. Education about foods in each group and how to make choices and monitor intake would be necessary. Educational strategies involving each of the five stages of consumption would be helpful. The concerns of young adults about digestibility and regulatory functions of these foods, chemical residues, and the relationship of increasing consumption of these foods to weight control are also viable

messages. More education and awareness raising is especially needed for individuals who are in the precontemplation stages for consumption of any of the three foods. Nutrition education programs addressing a specific stage, and specific food as well as a balanced intake of all the three food groups simultaneously would be helpful. Strategies for use with individuals in the same stages of consumption but in different settings such as living arrangements, marital status, college status, and residence should be formulated. Nutrition educators' roles should be to support the process of change as well to maintain change. Once that happens, the actual consumption would become less dependent on the situation at hand and more dependent on the increased awareness of the recommended intake that would support and promote health and well being.

Means and ways of increasing a sense of self-confidence in the young adults' ability to achieve adequate consumption are important. When individuals are not the ones who prepare the meals or do the shopping, then lack of time and poor access to these food items, contribute to a perception of loss of control over one's consumption of the foods. Eventually, increasingly positive attitudes about the food groups as well as situation-specific confidence toward increased consumption of fruits, vegetables, and grain products would be achieved.

The interest of this researcher in the transtheoretical model was driven by an inference that strategies to increase adoption of a health behavior can be enhanced by matching educational intervention to a person's current level of motivation and behavior, once it is determined. The motivation to change is expected to be influenced by an awareness of the problem, perceived costs and benefits of action, and perceived control of the behavior or self-efficacy. All these relationships have been tested empirically in this study. The results of the study confirm that an assumption that people are ready to change their diet is false, at least for

more than half the young adults in this study. Nutrition educators who do not understand this may blame clients for early attrition, unsuccessful change, lack of interest, or resistance to change rather than on lack of understanding or perceived ability to control the situation.

Nutrition educators need education on theoretical models such as the one explored in this study to have the instruments and skills necessary to assess readiness to change. Steps to prevent relapses in the consumption and maintenance of a varied diet, as well as more adequate consumption, are also needed. By focusing on the environment and lifestyles common to young adults, nutrition educators can help them to overcome or avoid counter-stimuli that could limit their consumption of fruits, vegetables, and grain products.

Implications for Research

The instrument developed in the study demonstrated practical utility for this sample of young adults. The respondents were able to understand the questions and respond to them. Indeed, many respondents commented that they found the staging algorithm used for responses different from other surveys but easy to follow. The major limitation encountered was the response rate to the mail survey (14.8%), suggesting that online data collection methods should be studied as a viable option to improve data collection from young adults. An additional task would be to further describe the accuracy of the staging algorithm with interviews using contingency questions and discriminant analysis of the stages of consumption.

The use of discrete and predetermined stages of consumption is intuitively appealing but poses some limitations. It presumes that only certain stages of consumption are possible. Other combinations of stages of consumption that may be food consumption behavior or also food specific may be missed. As such, the transitions among the stages of food consumption may need refining. A good construct or tool should distinguish clearly between chronic under-

consumption from slight deviations in action and maintenance. That is, there ought to be clear delineation of short-term deviations in consumption from total relapse, contemplation, and preparation stages in the same way that preparation and contemplation stages of consumption are distinct stages. A related issue is that the stages of preparation and contemplation, and action and maintenance, are distinguished quantitatively by a time factor and not qualitatively. Further investigation of the construct would clarify how stages of change can be precisely and specifically defined in terms of food consumption behaviors as both time based and desire based.

These existing discrete stages also may be more appropriate for cessation of risky behaviors than adoption of healthy ones where lifelong maintenance of a behavior is the goal. Further investigation of the stage of consumption construct as a continuous variable as opposed to a categorical, or discrete one, as used in this study, is also necessary. Assessing the stage of consumption using the two types of variables would greatly enrich the application of the stage of consumption concept.

The decisional balance tool was fraught with some problems because the items on the perceived advantages (pro scale) had a reliability coefficient of 0.47 to 0.65 (less than 0.70), indicating only moderate reliability (Nunnally, 1977). The scale also explained about 40-50% of the variance in decisional balance. The implication is that the scale was not capturing some crucial aspects of the decisional balance construct. Additional variables need to be investigated in order to accurately describe the stages of consumption.

While assessing barriers to increasing consumption of the foods, there is a need to determine which factor is strongest—the situation factors or negative attitudes toward consumption of the foods. The self-efficacy scale had good items ($\alpha > 0.8$). Longitudinal studies

to determine how well decisional balance and self-efficacy predict an increase in the consumption of the three food groups is an important next step.

This study is a contribution of the use of the transtheoretical model to assessment and monitoring of food consumption behaviors. The use of the transtheoretical model contributes important concepts to our understanding the food consumption of young adults; namely, that consumption of these foods is both a product of their intentions to increase consumption, and their current consumption and that the interactions of cognitive factors of self-efficacy and decisional balance with stages of consumption and situational factors are involved in determining readiness to increase consumption of fruits, vegetables, and grain products. Finally, replication of the current study would be useful in validating the findings with other samples, settings, and additional constructs related to food consumption.

APPENDIX A: QUALITATIVE RESEARCH PROTOCOL

1. Tell me what specific foods come to mind when I say "grains products", "fruits", "vegetables"?
2. Do you think you eat the recommend number of servings of grain products, fruits, or vegetables? More or less?
3. What keeps you from eating more grains, fruits, vegetables?
4. Do you think eating more of these foods would benefit you in any way?
5. Do you think eating more of these foods would cause you problems in any way?
6. Describe the characteristics of people your age who eat a lot of grain products, fruits, and vegetables...

[1]Adapted from North Central Region Collaborative Nutrition Project (NC-219).

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March 10, 1998

Dear Research Participant,

You are one of the young adults randomly selected to participate in this survey on Food Behaviors which is part of the Ph.D. research for Susan Maina. The Department of Family and Consumer Sciences Education and Studies supports this work and intends to use the results of the study to better understand young adults' needs and to eventually design appropriate nutrition education interventions. We believe the information you provide will be very useful. It also will contribute greatly to research on food behaviors. Please help us by answering the questions completely and honestly. The survey will take approximately 15-20 minutes to complete.

We want to encourage your participation in this study and assure you that only the research team will see your individual responses. Your answers will be completely confidential. Your name will not be associated in any way with your responses.

Please return the survey by March 31st, 1998. If you have any questions about the study, please feel free to contact Dr Rosalie Amos at 515-294-6444 or Susan Maina at 515-294-2925.

Thank you in advance for your participation.

Sincerely,

Rosalie J. Amos

Rosalie, J. Amos, Ph.D.
Associate Professor and Chair

Susan N. Maina

Susan N. Maina, MS
Ph.D. Candidate

YOUNG ADULT FOOD BEHAVIOR CHECKLIST

PART A: Current consumption of grain products, fruits, and vegetables.

1. **Grain Products.** How many servings a day of grain products do you usually eat? (Include bread, tortillas, cereal, rice, pasta, but not potatoes)

1 serving:	
	1 slice bread
	½ bun or bagel
	½ cup cereal, rice, or pasta
	3 cups popcorn
	10 corn chips
	3-4 crackers

Please CIRCLE one:

0, 1, 2, 3, 4 or 5

Do you intend to eat 6 or more servings a day in the next 6 months?

Please CIRCLE one: No (go on to next page)

Yes

Do you intend to eat 6 or more servings a day in the next 30 days?

Please CIRCLE one: No (go on to number 2)

Yes (go on to number 2)

6 or more

Have you been eating 6 or more servings a day for more than 6 months?

Please CIRCLE one: No (go on to number 2)

Yes (go on to number 2)

Fruits and Fruit juices. How many servings a day of fruit and fruit juices do you usually eat or drink? (Not juice drinks, Kool-aid, soda pop, Hi-C or Sunny Delight)

1 serving =	½ cup
	1 piece
	¾ cup juice

Please CIRCLE one:

0 or 1 **2 or more**

Have you been eating 2 or more servings a day for more than 6 months?

Please CIRCLE one: No (go on to number 3)

Yes (go on to number 3)

Do you intend to eat 2 or servings a day in the next 6

Please CIRCLE one: No (go on to number 3)

Yes

Do you intend to eat 2 or more servings a day in the next 30 days?

Please CIRCLE one: No (go on to number 3)

Yes (go on to number 3)

---

3. **Vegetables.** How many servings a day of vegetables do you usually eat? (Include potatoes, French fries, beans, tomatoes and tomato sauces)

1 serving =	1/2 cup beans
	1 cup leafy
	vegetable(e. g lettuce)

Please CIRCLE one:

0. 1 or 2 **3 or more**

Have you been eating 3 or more servings a day For more than 6 months?

Please CIRCLE one: No (go on to next page)

Yes (go on to next page)

Do you intend to eat 3 or more servings a day in the next 6 months?

Please CIRCLE one: No

Yes

Do you intend to eat 3 or more servings a day in the next 30 days?

Please CIRCLE one: No (go on to next page)

Yes (go on to next page)

PART B: Important factors in your decision to consume grain products, fruits, and vegetables

Each statement below represents a thought that might occur when a person is deciding whether or not to consume Grain products, Fruits, and Vegetables. Please write in the number that best describes **how important each factor would be when you are deciding whether or not to consume** the recommended number of servings of Grain products, Fruits, and Vegetables. There are five possible responses. Please record a separate response for each food group.

Key: 1 = Not Important at all 2 = Slightly Important 3 = Important
4 = Very Important 5 = Extremely Important

Importance of factor in my decision to eat:	Grain Products	Fruits	Vegetables
1. I have limited access to them.			
2. It would require too much time to plan meals containing			
3. It requires too much time to eat			
4. My risk for heart disease would decrease if I consumed more of			
5. These foods are easy snacks			
6. These foods would replace foods high in sugar and fat.			
7. I would not have the time to prepare these foods			
8. Consuming more of these foods add variety my diet.			
9. Eating more would keep me from getting sick/prevent illness.			
10. I would not have enough money to buy			
11. These foods would contain too many chemicals			
12. It would be difficult to find many foods that I like from this group			
13. I dislike the texture of			
14. These foods would be satisfying			
15. These foods would prevent irregularity			
16. I would feel healthier if I ate more of			
17. These foods would be easy to pack in a lunch			
18. It is hard to incorporate these foods in my meals			
19. I would have limited ways to prepare a variety of			
20. These foods would help me maintain a healthy weight			

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PART C: Typical situations related to your consumption of grain products, fruits, and vegetables.

On a scale of 1-9 choose one number that **most precisely reflects how confident you feel now about being able to consume the recommended number of servings** for Grain products, Fruits, and Vegetables under the given situations. Please record a separate response for each food group.

Grain products:
1 serving =
- 1 slice bread
- ½ bagel/bun
- ½ cup cereal, rice, pasta
- 3 cups popcorn
- 10 corn chips
- 3-4 crackers

Recommended
6-11 servings/day

Vegetables:
1 serving =
- ½ cup
- 1 cup lettuce
- ½ cup beans

Recommended
3-5 servings/day

Fruit/Fruit Juices:
1 serving =
- ½ cup
- 1 piece
- ¾ cup juice

Recommended
2-4 servings/day

1 2 3 4 5 6 7 8 9

Not confident at all — Very confident

I am confident that:	Grain Products	Fruits	Vegetables
1. I can eat the recommended number of servings of these foods when faced with new choices.			
2. I know the recommended number of servings for			
3. I can eat the recommended number of servings per day of			
4. I can make time to prepare these foods.			
5. I can keep these foods at hand/readily available.			
6. I can eat these foods at least once a day.			
7. I can eat three or more servings per day of			
8. I can keep track of the number of servings I eat of			
9. I can eat the recommended number of servings of these foods when I eat on my own.			
10. I can eat more of these when I eat with others.			
11. I can shop for a variety of these foods all year.			
12. I can choose these for snacks.			
13. When I eat at home, I can eat more of these.			

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1 2 3 4 5 6 7 8 9

Not confident at all Very confident

I am confident that :	Grain Products	Fruits	Vegetable
14. I can make the effort to take these foods to work/school.			
15. I can eat the recommended number of servings on a limited budget.			
16. I can consume the recommended number of servings from a few of these foods that I like.			
17. I can learn to like more of these foods			
18. I can prepare these foods with limited equipment			
19. Even when I eat at the restaurant /dining center/dorm/cafeteria, I can eat the recommended number of servings of these foods.			
20. I can try to eat these foods more often.			

PART D: General Characteristics

Please answer the following questions as accurately as possible. **Check the appropriate response.**

1. What is your gender?

☐ 1=Female ☐ 2=Male

2. Your age? _____ Years.

3 What is your living arrangement?

☐ 1 = Residence Hall ☐ 2 = At home with parent (s)

☐ 3 = Rent with others ☐ 4 = Living alone

☐ 5 = Sorority/Fraternity

4 What best describes your current relationship status ?

☐ 1 =Never Married ☐ 2 = Married/living as married

☐ 3 = Married with children ☐ 4 = Separated

☐ 5= Divorced ☐ 6= Widowed

5 Which of the following describes your college status?

☐ 1 = Full-time student ☐ 2= Part-time student

☐ 3= Not a student ☐ 4= Graduated from college

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6 Which best describes where you live?

☐ 1= City ☐ 2 = Suburb ☐ 3 = Rural

7. What is your race?

☐ 1 = African American

☐ 2 = Asian/Pacific Islander

☐ 3 = Native American/Alaskan native/Aleut

☐ 4 = White/Caucasian

☐ 5= Other or combinations (please describe):_____

8. Are you of Hispanic origin?

☐ 1 = Yes ☐ 2 = No

9. Which represents your income from all sources over the past year?

☐ 1=Under $10,000 ☐ 2=$10,000-$14,999 ☐ 3 = $15,000-19,999

☐ 4 = 20,000-$24,999 ☐ 5 = $25,000-$29,999 ☐ 6 = $30,000-34,999

10. During a typical month how much money do you have to spend on food?

☐ 1 = Less than $50 ☐ 3 = From $100 to $200 ☐ 5 = More than $ 300

☐ 2 = From $50 to $100 ☐ 4 = From $200 to $ 300

11. How would you describe your current diet and health status? (check all appropriate responses)

☐ 1 = Health conscious ☐ 2= Athletic ☐ 3 = Weight watcher

☐ 4 = Vegetarian ☐ 5= Energetic ☐ 6 = Disciplined eater

☐ 7 =_____other (specify)

THANK YOU!

Thank you for taking time to fill out this survey. Please fold, tape, and mail this survey back by March 31st to:

Rosalie Amos & Nyambura Susan Maina

Department of Family and Consumer Sciences Education and Studies

219 MacKay Hall , Iowa State University. Ames, Iowa. 50011

Maina

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IMAGE EVALUATION
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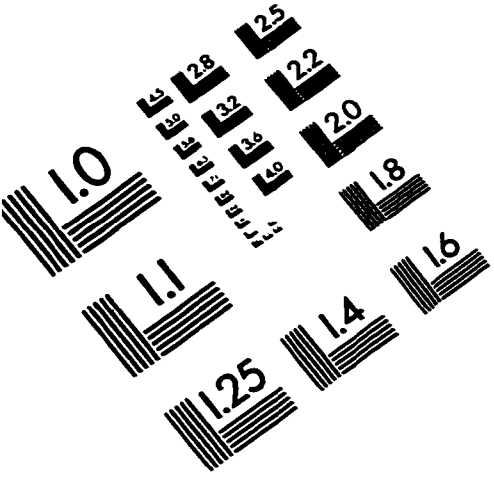

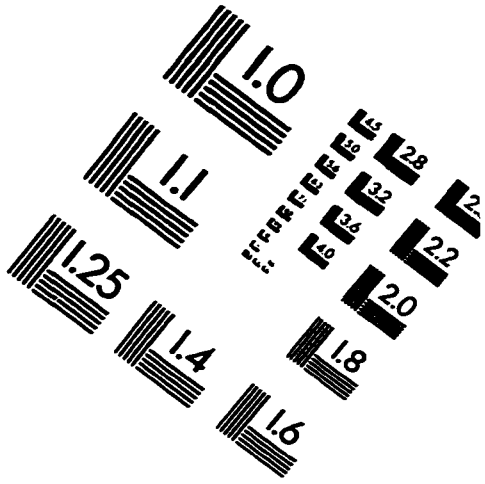

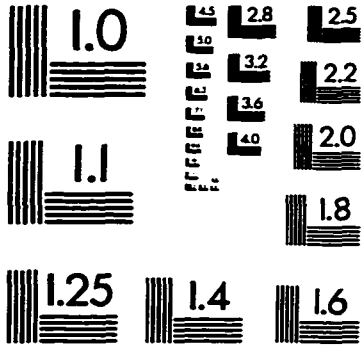

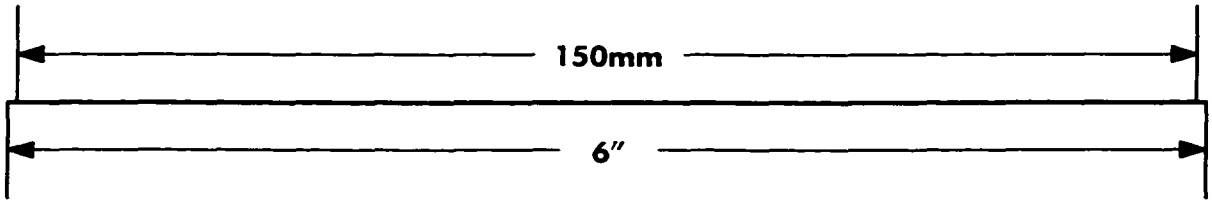

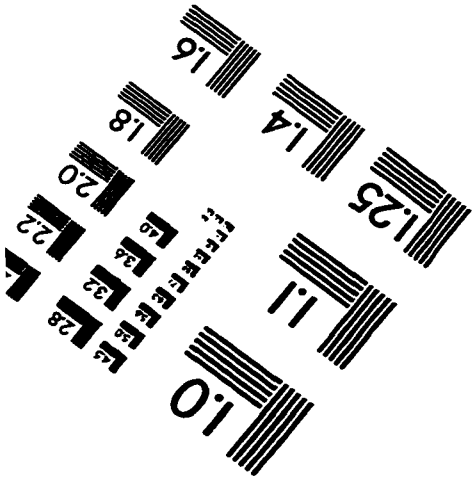

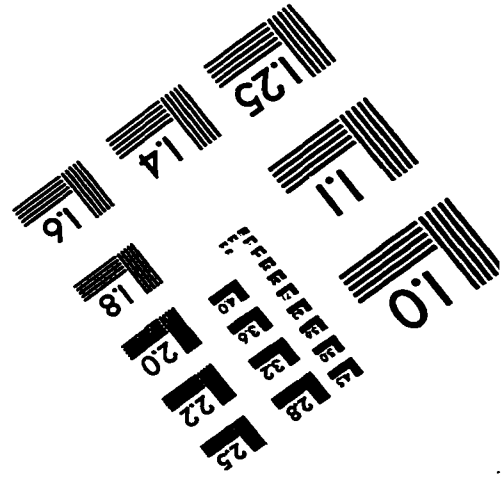

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